RDR-VX500
RMT-V505

SERVICE MANUAL

US Model
Canadian Model

TS-10 MECHANISM

Refer to the SERVICE MANUAL of VHS MECHANICAL ADJUSTMENT MANUAL VII for MECHANICAL ADJUSTMENTS. (9-921-790-11)

SPECIFICATIONS

System

DVD recorder section
Laser
Semiconductor laser
Audio recording format
Dolby Digital
Video recording format
MPEG Video

VCR section
Format
VHS NTSC standard
Video recording system
Rotary head helical scanning FM system
Video heads
Double azimuth four heads
Video signal
NTSC color, EIA standards
Tape speed
SP: 33.35 mm/s ($1^{3}/_{8}$ inches/s)
EP: 11.12 mm/s ($^{7}/_{16}$ inches/s)
LP: 16.67 mm/s ($^{11}/_{16}$ inches/s), playback only

Maximum recording/playback time
8 hrs. in EP mode (with T-160 tape)
Rewind time
Approx. 1 min (with T-120 tape)

Tuner section
Channel coverage
VHF 2 to 13
UHF 14 to 69
CATV A-8 to A-1, A to W, W+1 to W+84
Antenna
75-ohm antenna terminal for VHF/UHF

Timer section
Clock
Quartz locked
Timer indication
12-hour cycle
Timer setting
12 programs in total (max.)

Inputs and outputs
LINE 1 IN and LINE 2 IN
VIDEO IN, phono jack (1 each)
Input signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
AUDIO IN, phono jacks (2 each)
Input level: 327 mVrms
Input impedance: more than 47 kilohms
LINE 2 IN
S VIDEO, 4-pin, mini-DIN jack
Y: 1.0 Vp-p, unbalanced, sync negative
C: 0.286 Vp-p, load impedance 75 ohms
DV IN, 4-pin jack, i.LINK S100
LINE OUT
VIDEO OUT, phono jack (1)
Output signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
AUDIO OUT, phono jacks (2)
Standard output: 327 mVrms
Load impedance: 47 kilohms
Output impedance: less than 10 kilohms

— Continued on next page —

VIDEO CASSETTE RECORDER/ DVD RECORDER

SONY

DIGITAL AUDIO OUT
OPTICAL, Optical output jack
−18 dBm (wave length: 660 nm)
COAXIAL, phono jack
Output signal: 0.5 Vp-p, 75 ohms

COMPONENT VIDEO OUT (Y, Pb, Pr)
Phono jack
Y: 1.0 Vp-p/Pb, Pr: 0.7 Vp-p, 75 ohms

S VIDEO OUT
4-pin, mini-DIN jack
Y: 1.0 Vp-p, unbalanced, sync negative
C: 0.286 Vp-p, load impedance 75 ohms

General

Power requirements
120 V AC, 60 Hz

Power consumption
42 W

Power back-up
Back-up duration: 0 min

Operating temperature
5°C to 35°C (41°F to 95°F)

Storage temperature
−20°C to 60°C (−4°F to 140°F)

Operating humidity
25% to 80%

Dimensions including projecting parts and controls (w/h/d)
Approx. 430 × 85 × 334 mm
(Approx. 17 × 3.4 × $13^{1}/_{4}$ inches)

Mass
Approx. 5.9 kg (Approx. 13.0 lbs)

Supplied accessories
Remote commander (remote) (1)
Size AA (R6) batteries (2)
Antenna cable (1)
Audio/video cord (1)

Design and specifications are subject to change without notice.

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
4. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
5. Check the line cord for cracks and abrasion. Recommend the replacement of any such line cord to the customer.
6. Check the B+ voltage to see it is at the values specified.
7. Check the antenna terminals, metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

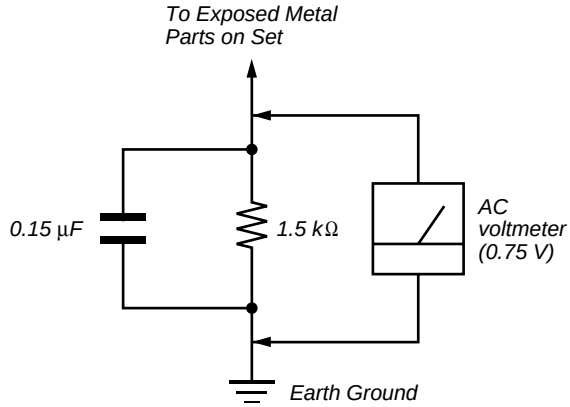

Fig. A. Using an AC voltmeter to check AC leakage.

WARNING!!

WHEN SERVICING, DO NOT APPROACH THE LASER EXIT WITH THE EYE TOO CLOSELY. IN CASE IT IS NECESSARY TO CONFIRM LASER BEAM EMISSION, BE SURE TO OBSERVE FROM A DISTANCE OF MORE THAN 25 cm FROM THE SURFACE OF THE OBJECTIVE LENS ON THE OPTICAL PICK-UP BLOCK.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 0.5 mA (500 microamperes). Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 0.75V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 2V AC range are suitable. (See Fig. A)

Unleaded solder

Boards requiring use of unleaded solder are printed with the lead-free mark (LF) indicating the solder contains no lead.
(Caution: Some printed circuit boards may not come printed with the lead free mark due to their particular size.)

: LEAD FREE MARK

Unleaded solder has the following characteristics.

- Unleaded solder melts at a temperature about 40°C higher than ordinary solder.
  Ordinary soldering irons can be used but the iron tip has to be applied to the solder joint for a slightly longer time.
  Soldering irons using a temperature regulator should be set to about 350°C.
  Caution: The printed pattern (copper foil) may peel away if the heated tip is applied for too long, so be careful!
- Strong viscosity
  Unleaded solder is more viscous (sticky, less prone to flow) than ordinary solder so use caution not to let solder bridges occur such as on IC pins, etc.
- Usable with ordinary solder
  It is best to use only unleaded solder but unleaded solder may also be added to ordinary solder.

CAUTION:

The use of optical instrument with this product will increase eye hazard.

CAUTION
Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

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PRECAUTIONS

1 SAFETY PRECAUTIONS

1) Before returning an instrument to the customer, always make a safety check of the entire instrument, including, but not limited to, the following items:

(1) Be sure that no built-in protective devices are defective or have been defeated during servicing.
(1)Protective shields are provided to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience.
(2)When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including, but not limited to, nonmetallic control knobs, insulating fish papers, adjustment and compartment covers/ shields, and isolation resistor/capacitor networks. Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning.

(2) Be sure that there are no cabinet openings through which adults or children might be able to insert their fingers and contact a hazardous voltage. Such openings include, but are not limited to, excessively wide cabinet ventilation slots, and an improperly fitted and/or incorrectly secured cabinet back cover.

(3) Leakage Current Hot Check-With the instrument completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards institute (ANSI) C101.1 Leakage Current for Appliances and Underwriters Laboratories (UL) 1270 (40.7). With the instrument's AC switch first in the ON position and then in the OFF position, measure from a known earth ground (metal water pipe, conduit, etc.) to all exposed metal parts of the instrument (antennas, handle brackets, metal cabinets, screwheads, metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis.
Any current measured must not exceed 0.5mA. Reverse the instrument power cord plug in the outlet and repeat the test. See Fig. 1.
Any measurements not within the limits specified herein indicate a potential shock hazard that must be eliminated before returning the instrument to the customer.

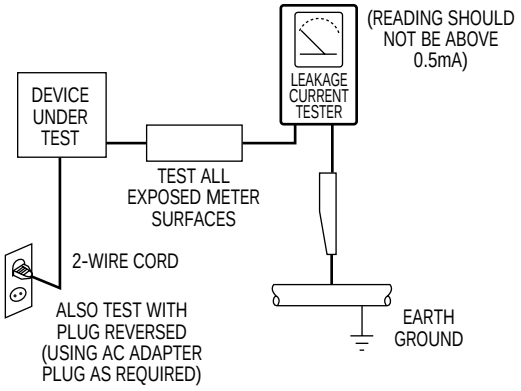

(READING SHOULD NOT BE ABOVE 0.5mA)
LEAKAGE CURRENT TESTER
DEVICE UNDER TEST
TEST ALL EXPOSED METER SURFACES
2-WIRE CORD
ALSO TEST WITH PLUG REVERSED (USING AC ADAPTER PLUG AS REQUIRED)
EARTH GROUND

Fig. 1 AC Leakage Test

(4) Insulation Resistance Test Cold Check-(1) Unplug the power supply cord and connect a jumper wire between the two prongs of the plug. (2) Turn on the power switch of the instrument. (3) Measure the resistance with an ohmmeter between the jumpered AC plug and all exposed metallic cabinet parts on the instrument, such as screwheads, antenna, control shafts, handle brackets, etc. When an exposed metallic part has a return path to the chassis, the reading should be between 1 and 5.2 megohm. When there is no return path to the chassis, the reading must be infinite. If the reading is not within the limits specified, there is the possibility of a shock hazard, and the instrument must be repared and rechecked before it is returned to the customer. See Fig. 2.

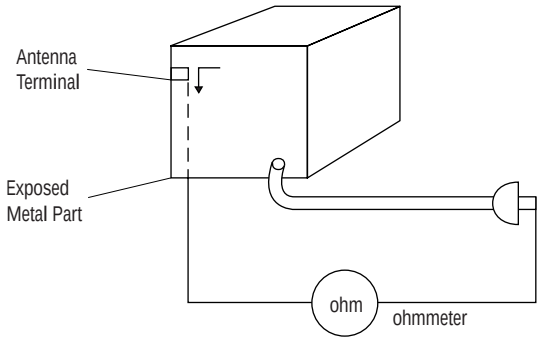


Fig. 2 Insulation Resistance Test

2) Read and comply with all caution and safety related notes on or inside the cabinet, or on the chassis.

3) Design Alteration Warning-Do not alter or add to the mechanical or electrical design of this instrument. Design alterations and additions, including but not limited to, circuit modifications and the addition of items such as auxiliary audio output connections, might alter the safety characteristics of this instrument and create a hazard to the user. Any design alterations or additions will make you, the servicer, responsible for personal injury or property damage resulting therefrom.

4) Observe original lead dress. Take extra care to assure correct lead dress in the following areas:
(1) near sharp edges, (2) near thermally hot parts (be sure that leads and components do not touch thermally hot parts), (3) the AC supply, (4) high voltage, and (5) antenna wiring. Always inspect in all areas for pinched, out-of-place, or frayed wiring, Do not change spacing between a component and the printed-circuit board. Check the AC power cord for damage.

5) Components, parts, and/or wiring that appear to have overheated or that are otherwise damaged should be replaced with components, parts and/ or wiring that meet original specifications.
Additionally, determine the cause of overheating and/or damage and, if necessary, take corrective action to remove any potential safety hazard.

6) Product Safety Notice-Some electrical and mechanical parts have special safety-related characteristics which are often not evident from visual inspection, nor can the protection they give necessarily be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified by shading, an (⚠) or a (⚠) on schematics and parts lists. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part might create shock, fire and/or other hazards. Product safety is under review continuously and new instructions are issued whenever appropriate.

2 SERVICING PRECAUTIONS

CAUTION: Before servicing units covered by this service manual and its supplements, read and follow the Safety Precautions section of this manual.

Note: If unforseen circumstances create conflict between the following servicing precautions and any of the safety precautions, always follow the safety precautions. Remember: Safety First.

2-1 General Servicing Precautions

(1) a. Always unplug the instrument's AC power cord from the AC power source before (1) re-moving or reinstalling any component, circuit board, module or any other instrument assembly, (2) disconnecting any instrument electrical plug or other electrical connection, (3) connecting a test substitute in parallel with an electrolytic capacitor in the instrument.
   b. Do not defeat any plug/socket B+ voltage interlocks with which instruments covered by this service manual might be equipped.
   c. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
   d. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the test instrument positive lead. Always remove the test instrument ground lead last.

Note: Refer to the Safety Precautions section ground lead last.

(2) The service precautions are indicated or printed on the cabinet, chassis or components. When servicing, follow the printed or indicated service precautions and service materials.

(3) The components used in the unit have a specified flame resistance and dielectric strength.
When replacing components, use components which have the same ratings. Components identified by shading, by (⚠) or by (⚠) in the circuit diagram are important for safety or for the characteristics of the unit. Always replace them with the exact replacement components.

(4) An insulation tube or tape is sometimes used and some components are raised above the printed wiring board for safety. The internal wiring is sometimes clamped to prevent contact with heating components. Install such elements as they were.

(5) After servicing, always check that the removed screws, components, and wiring have been installed correctly and that the portion around the serviced part has not been damaged and so on. Further, check the insulation between the blades of the attachment plug and accessible conductive parts.

2-2 Insulation Checking Procedure

Disconnect the attachment plug from the AC outlet and turn the power ON. Connect the insulation resistance meter (500V) to the blades of the attachment plug. The insulation resistance between each blade of the attachment plug and accessible conductive parts (see note) should be more than 1 Megohm.

Note: Accessible conductive parts include metal panels, input terminals, earphone jacks, etc.

3 ESD PRECAUTIONS

Electrostatically Sensitive Devices (ESD)

Some semiconductor (solid state) devices can be damaged easily by static electricity.
Such components commonly are called Electrostatically Sensitive Devices (ESD). Examples of typical ESD devices are integrated circuits and some field-effect transistors and semiconductor chip components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

(1) Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.

(2) After removing an electrical assembly equipped with ESD devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.

(3) Use only a grounded-tip soldering iron to solder or unsolder ESD devices.

(4) Use only an anti-static solder removal devices. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ESD devices.

(5) Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESD devices.

(6) Do not remove a replacement ESD device from its protective package until immediately before your are ready to install it. (Most replacement ESD devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive materials).

(7) Immediately before removing the protective materials from the leads of a replacement ESD device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

(8) Minimize bodily motions when handling unpackaged replacement ESD devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ESD device).

4 HANDLING THE OPTICAL PICK-UP

The laser diode in the optical pick up may suffer electrostatic breakdown because of potential static electricity from clothing and your body.

The following method is recommended.

(1) Place a conductive sheet on the work bench (The black sheet used for wrapping repair parts.)

(2) Place the set on the conductive sheet so that the chassis is grounded to the sheet.

(3) Place your hands on the conductive sheet(This gives them the same ground as the sheet.)

(4) Remove the optical pick up block

(5) Perform work on top of the conductive sheet. Be careful not to let your clothes or any other static sources to touch the unit.

- Be sure to put on a wrist strap grounded to the sheet.
- Be sure to lay a conductive sheet made of copper etc. Which is grounded to the table.

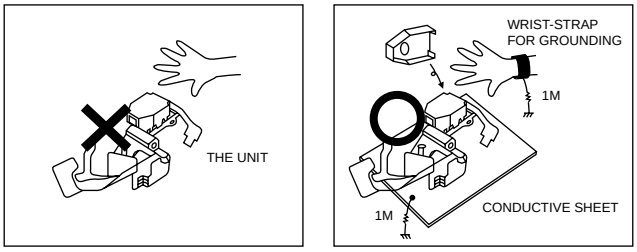


Fig.3

(6) Short the short terminal on the PCB, which is inside the Pick-Up ASS'Y, before replacing the Pick-Up. (The short terminal is shorted when the Pick-Up Ass'y is being lifted or moved.)

(7) After replacing the Pick-up, open the short terminal on the PCB.

MEMO

1. GENERAL

This section is extracted from instruction manual.
(2-186-506-11)

About this manual

- Instructions in this manual describe the controls on the remote. You can also use the controls on the recorder if they have the same or similar names as those on the remote.
- The on-screen display illustrations used in this manual may not match the graphics displayed on your TV screen.
- The explanations regarding discs in this manual refer to discs created on this recorder. The explanations do not apply to discs that are created on other recorders and played back on this recorder.

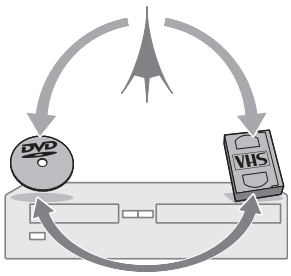
Icon	Meaning
+RW	Functions available for DVD+RWs
-RWVR	Functions available for DVD-RWs in VR (Video Recording) mode
-RWVideo	Functions available for DVD-RWs in video mode
+R	Functions available for DVD+Rs
-R	Functions available for DVD-Rs
DVD	Functions available for DVD VIDEOs
VCD	Functions available for VIDEO CDs, Super VCDs or CD-Rs/CD-RWs in video CD format or Super VCD format
CD	Functions available for music CDs or CD-Rs/CD-RWs in music CD format
DATA CD	Functions available for DATA CDs (CD-Rs/CD-RWs containing MP3* audio tracks or JPEG files)
VHS	Functions available for VHS VIDEOs

* MP3 (MPEG1 Audio Layer 3) is a standard format defined by ISO/MPEG which compresses audio data.

Ways to Use Your Video Cassette Recorder/DVD Recorder

What is a Video Cassette Recorder/DVD Recorder?

➡ This is a DVD recorder with built-in VHS video deck. It allows recording to DVD+RWs, DVD+Rs, DVD-RWs, DVD-Rs, and VHS tapes. In addition, you can also enjoy playback and editing of DVD discs and VHS tapes.



Operation restrictions

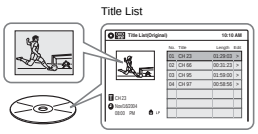
Current operation	Possible simultaneous operations			
	VHS		DVD	
	Playback	Recording	Playback	Recording
Playing a VHS tape	—	No	Yes*1	Yes*1
Recording on a VHS tape	No	—	Yes	Yes
Playing a DVD disc	Yes*2	Yes*2	—	No
Recording on a DVD disc	Yes	Yes	No	—

*1 When pressing DVD, VHS tape playback stops.
*2 When pressing VIDEO, DVD playback stops.

5 8

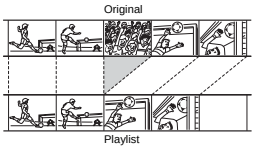
Quick access to recorded titles – Title List

➡ Display the Title List to see all of the titles on the disc, including the recording date, channel, recording mode, recording time and movie thumbnail image (page 42).



Creating your own program – Playlist

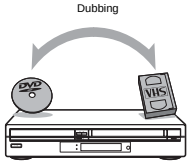
➡ Record a program on a DVD-RW (VR mode), then erase, move and add scenes at will to create your own, original program (page 84).



One touch button dubbing from VCR to DVD

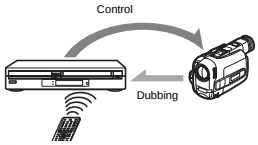
➡ This recorder lets you dub from VHS tape to DVD and from DVD to VHS tape with a single deck (page 89).

* Note that when playing back and recording a DVD or VHS tape that includes a copy protect signal, the copy protect function will prevent normal recording.



Simple dubbing of DV tapes – DV Edit

➡ Connect your digital video camera to the DV IN jack and simply dub the entire contents or just selected scenes to a DVD disc (page 93).



A list of recordable and playable DVD discs is on page 10.

Quick Guide to DVD Disc Types

Recordable and playable discs

Type		Disc Logo	Icon used in this manual	Formatting (new discs)	Compatibility with other DVD players (finalizing)
DVD+RW		DVD+ReWritable	+RW	Automatically formatted	Playable on DVD+RW compatible players (automatically finalized)
DVD-RW	VR mode	DVD RW	-RWVR	Format in VR mode*2 (page 43)	Playable only on VR mode compatible players (finalization unnecessary) (page 44)
	Video mode		-RWVideo	Format in Video mode*2 (page 43)	Playable on most DVD players (finalization necessary) (page 44)
DVD+R		DVD+R	+R	Automatically formatted	Playable on DVD+R compatible players (finalization necessary) (page 44)
DVD-R		DVD R R4.7	-R	Automatically formatted	Playable on most DVD players (finalization necessary) (page 44)

Usable disc versions (as of June 2004)

- 4x-speed or slower DVD+RWs
- 2x-speed or slower DVD-RWs (Ver.1.1, Ver.1.1 with CPRM*1)
- 4x-speed or slower DVD-RWs (Ver.1.2, Ver.1.2 with CPRM)
- 8x-speed or slower DVD+Rs
- 8x-speed or slower DVD-Rs (Ver.2.0)

"DVD+RW," "DVD-RW," "DVD+R," and "DVD-R," are trademarks.

*1 CPRM (Content Protection for Recordable Media) is a coding technology that protects copyrights for images.
*2 Unused DVD-RWs are formatted in VR mode automatically.
*3 Erasing titles only frees up disc space if you erase the last title.
*4 Erasing titles does not free up disc space.

9 10

	Recording Features			Editing Features			
	Rewrite (page 48)	Auto Chapter (page 104)	Manual Chapter (page 84)	Change title name (page 82)	Erase title (page 82)	A-B Erase (page 83)	Playlist (page 84)
	Yes	Yes	Yes	Yes	Yes*3	No	No
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	No	Yes	Yes*3	No	No
	No	Yes	No	Yes	Yes*4	No	No
	No	Yes	No	Yes	Yes*4	No	No

Discs that cannot be recorded on

- DVD-RWs (Ver.1.0)
- DVD+RWs that are not 2.4x-speed compatible
- Double layer discs
- 8 cm discs

12 cm/8 cm discs

Operation	DVD+RW		DVD-RW				DVD+R		DVD-R	
			VR mode		Video mode					
	12 cm	8 cm	12 cm	8 cm	12 cm	8 cm	12 cm	8 cm	12 cm	8 cm
Playback	Yes	—	Yes	Yes	Yes	Yes	Yes	—	Yes	Yes
Recording	Yes	—	Yes	No	Yes	No	Yes	—	Yes	No

Playable discs

Type	Disc Logo	Icon used in this manual	Characteristics
DVD VIDEO	DVD VIDEO	DVD	Discs such as movies that can be purchased or rented
VIDEO CD	COMPACT disc DIGITAL VIDEO	VCD	VIDEO CDs or CD-Rs/CD-RWs in VIDEO CD/ Super VIDEO CD format (with PBC function)
CD	COMPACT disc DIGITAL AUDIO	CD	Music CDs or CD-Rs/CD-RWs in music CD format that can be purchased
DATA CD	COMPACT disc Recordable ReWritable	DATA CD	CD-Rs/CD-RWs created on a PC or similar device in music format, or MP3 or JPEG format that conforms to ISO9660* Level 1/Level 2

* A logical format of files and folders on DATA-CDs, defined by ISO (International Standard Organization).

Discs that cannot be played

- CD-Rs/CD-RWs, other than those recorded in music CD format, MP3 or JPEG format, or Video CD format
- Data part of CD-Extras
- DVD-ROMs
- DVD Audio discs
- DVD-RAMs
- HD layer on Super Audio CDs
- DVD VIDEOs with a different region code (see page 13)
- A disc recorded in a color system other than NTSC, such as PAL or SECAM

Hint

This DVD recorder can play 8 cm CDs and 8 cm DVDs as well.

→continued 11 12

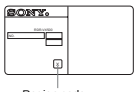
Note on playback operations of DVD VIDEOs/ VIDEO CDs

Some playback operations of DVD VIDEOs/ VIDEO CDs may be intentionally set by software producers. Since this recorder plays DVD VIDEOs/VIDEO CDs according to the disc contents the software producers designed, some playback features may not be available. Also, see the instructions supplied with the DVD VIDEOs/ VIDEO CDs.

Region code (DVD VIDEO only)

Your recorder has a region code printed on the rear of the unit and will only play DVD VIDEOs (playback only) labeled with identical region codes. This system is used to protect copyrights. DVD VIDEOs labeled (🌐) will also play on this recorder.

If you try to play any other DVD VIDEO, the message "Please check the Regional code of this disc." will appear on the TV screen. Depending on the DVD VIDEO, no region code indication may be labeled even though playing the DVD VIDEO is prohibited by area restrictions.



Region code

Music discs encoded with copyright protection technologies

This product is designed to playback discs that conform to the Compact Disc (CD) standard. Recently, various music discs encoded with copyright protection technologies are being marketed by some record companies. Please be aware that among those discs, there are some that do not conform to the CD standard and may not be playable by this product.

Notes

- Some DVD+RWs/DVD+Rs, DVD-RWs/DVD-Rs, or CD-RWs/CD-Rs cannot be played on this recorder due to the recording quality or physical condition of the disc, or the characteristics of the recording device and authoring software. The disc will not play if it has not been correctly finalized. For more information, see the operating instructions for the recording device.
- You cannot mix VR mode and Video mode on the same DVD-RW. To change the disc's format, reformat the disc (page 43). Note that the disc's contents will be erased after reformatting.
- You cannot shorten the time required for recording even with high-speed discs. Also, you cannot record on the disc if the disc is not 1x speed compatible.
- It is recommended that you use discs with "For Video" printed on their packaging.
- You cannot add new recordings to DVD-Rs or DVD-RWs (Video mode) that contain recordings made on other DVD equipment.
- In some cases, you may not be able to add new recordings to DVD+RWs that contain recordings made on other DVD equipment. If you do add a new recording, note that this recorder will rewrite the DVD menu.
- If the disc contains PC data unrecognizable by this recorder, the data may be erased.

Recordable and playable VHS tapes

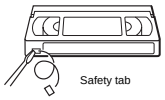
This VCR uses the VHS system.

Recording

This VCR records using the VHS system.

Hint

If you do not want recorded contents to be erased, break off the erasure prevention tab. To record again on a tape that has had the erasure prevention tab removed, cover the hole with cellophane tape, etc.



Safety tab

Notes

- This VCR cannot record using the S-VHS system.
- Tapes recorded in EP (3×) mode by this VCR cannot be played back on standard mode only VHS decks.
- Noise may appear in the image when tapes recorded in EP (3×) mode by this VCR are played back on other VHS decks with 3× mode.

Playback

The VCR automatically identifies the recording system and recording mode (SP (standard) or EP (3×)) of recorded tapes during playback.

Notes

- You cannot play back foreign video software that uses non-NTSC color TV systems (PAL, SECAM).
- When playing back tapes recorded using the S-VHS system, the playback image may be disturbed.

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Hooking Up the Recorder

Follow steps 1 to 7 to hook up and adjust the settings of the recorder.

Notes

- Plug cords securely to prevent unwanted noise.
- Refer to the instructions supplied with the components to be connected.
- Be sure to disconnect the power cord of each component before connecting.

Step 1: Unpacking

Check that you have the following items:
- Audio/video cord (pinplug × 3 ⟷ pinplug × 3) (1)
- Antenna cable (1)
- Remote commander (remote) (1)
- Size AA (R6) batteries (2)

Step 2: Connecting the Antenna Cable

Select one of the following antenna hookups. Do not connect the power cord until you reach "Connecting the Power Cord" on page 26.

If you have	Hookup
Cable box or satellite receiver with a video/audio output	A (page 16)
Cable box with an antenna output only	B (page 17)
Cable without cable box, or antenna only (no cable TV)	C (page 17)

Note to CATV system installer (in USA)

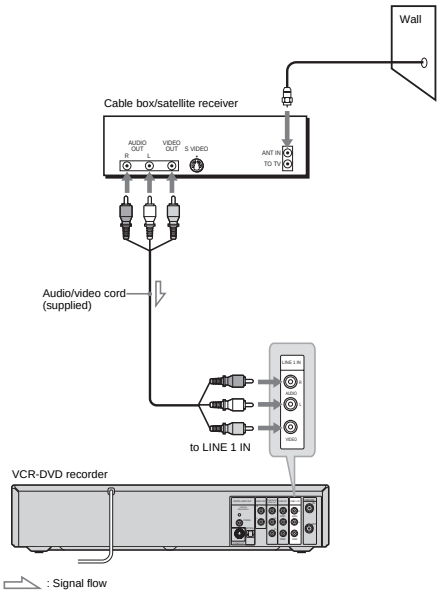
This reminder is provided to call the CATV system installer's attention to Article 820- 40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

Notes

- If your antenna is a flat cable (300-ohm twin lead cable), use an external antenna connector (not supplied) to connect the antenna to the recorder.
- If you have separate cables for VHF and UHF antennas, use a UHF/VHF band mixer (not supplied) to connect the antenna to the recorder.

A: Cable box or satellite receiver with a video/audio output

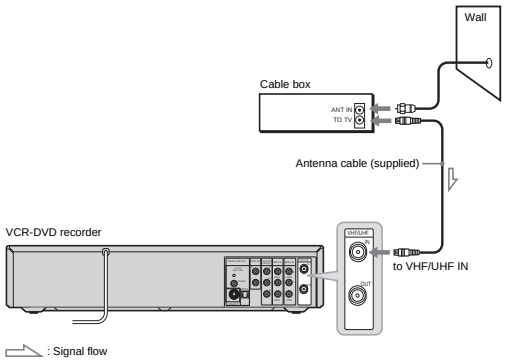
With this hookup, you can record any channel on the cable box or satellite receiver. Be sure that the satellite receiver or cable box is turned on.
To watch cable or satellite programs, you need to match the channel on the recorder (L1) to the input jack connected to the cable box or satellite receiver (LINE 1 IN).



➞continued

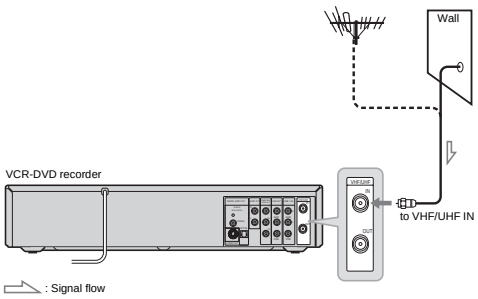
B: Cable box with an antenna output only

With this hookup, you can record any channel on the satellite receiver or cable box. Be sure that the satellite receiver or cable box is turned on.
To watch cable programs, you need to match the channel on the recorder (2ch, 3ch or 4ch) to the antenna output channel on the cable box (2ch, 3ch or 4ch).



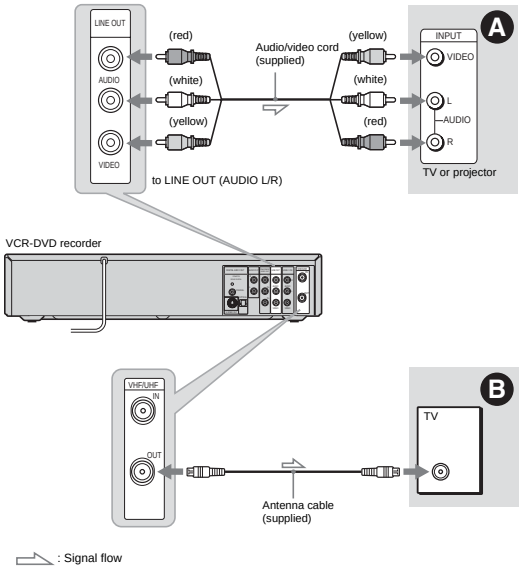
C: Cable without cable box, or antenna only (no cable TV)

Use this hookup if you watch cable channels without a cable box. Also use this hookup if you are using a VHF/UHF antenna or separate VHF and UHF antennas.
With this hookup, you can record any channel by selecting the channel on the recorder.



Step 3: Connecting to Your TV

Select one of the following patterns Ⓐ or Ⓑ, according to the input jack on your TV.

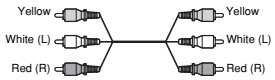


Note

Do not connect more than one type of video cord between the recorder and your TV at the same time.

Ⓐ Connecting to audio/video input jacks

If your TV, monitor, projector, or other equipment has audio/video (A/V) input jacks, you will get better picture and sound if you connect the recorder using this connection.

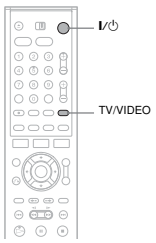


Ⓑ Connecting to an antenna input jack

If your TV does not have audio/video (A/V) input jack, connect the recorder to a TV using an antenna cable.

Setting the RF Output channel

When connecting the recorder to the TV using only the antenna cable, you must set the RF Output channel in the "Tuner Preset" so that the TV can receive the correct signal from the recorder.



1 Press I/⏻ to turn on the recorder.

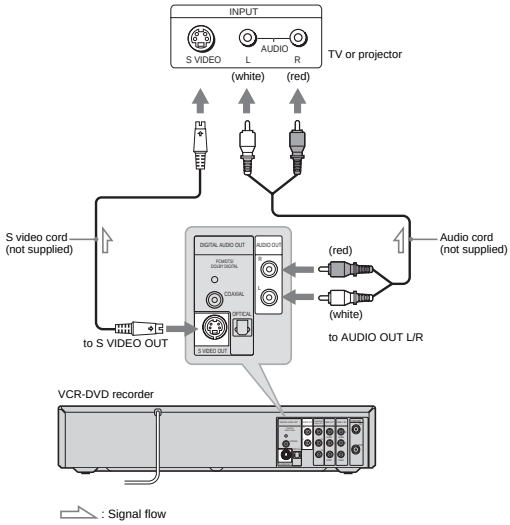
2 Press TV/VIDEO repeatedly until "TV" disappears from the front panel display.

3 Turn on your TV and set it to the channel 3. When using channel 4 to receive the recorder signal, see "3, 4 Ch Out" on page 98.

➡continued

If your TV has an S video input jack

Connect an S video cord (not supplied). You will enjoy high quality images.
Make audio connections using the AUDIO OUT L/R jacks when you connect the recorder using this connection.

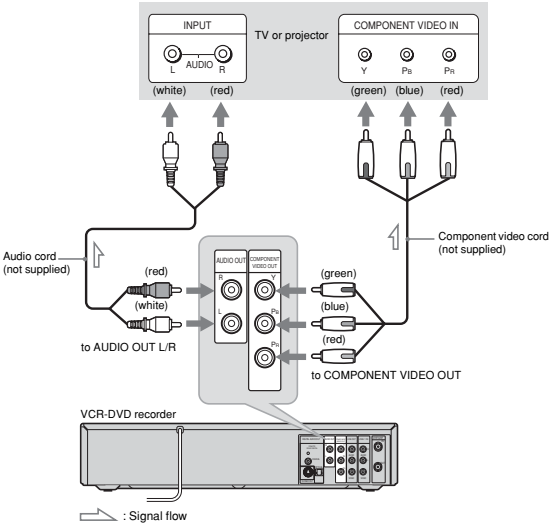


Notes

- Do not connect more than one type of video cord between the recorder and your TV at the same time.
- When recording a DVD, the DVD video signal is output to the S VIDEO OUT even if you switch the output to VIDEO.

If your TV has component video input jacks

Connect the COMPONENT VIDEO OUT jacks using a component video cord (not supplied) or three video cords (not supplied) of the same kind and length. You will enjoy accurate color reproduction and high quality images.
If your TV accepts progressive 480p format signals, you must use this connection and then set "Progressive" of "Video" to "On" in the "Setup" display (page 101). The PROGRESSIVE indicator lights up when the recorder outputs progressive signals.
Make audio connections using the AUDIO OUT L/R jacks when you connect the recorder using this connection.



When playing "wide screen" images

Some recorded images may not fit your TV screen. To change the aspect ratio, see page 100.

Hint

Video signal can also be output from the COMPONENT VIDEO OUT jack when playing a VHS tape.

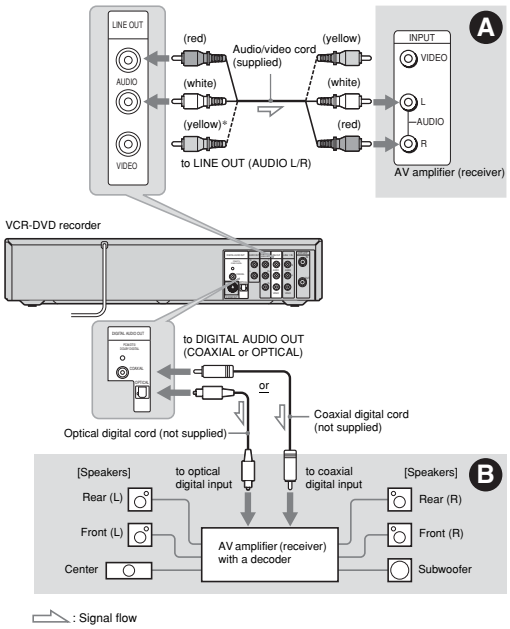
Notes

- Consumers should note that not all high definition television sets are fully compatible with this product and may cause artifacts to be displayed in the picture. In the case of 480 progressive scan picture problems, it is recommended that the user switch the connection to the 'standard definition' output. If there are questions regarding our TV set compatibility with this model 480p DVD recorder, please contact our customer service center.
- When recording a DVD, the DVD video signal is output to the COMPONENT VIDEO OUT even if you switch the output to VIDEO.

➡continued

Step 4: Connecting to Your AV/Amplifier (Receiver)

Select one of the following patterns Ⓐ or Ⓑ, according to the input jack on your AV amplifier (receiver). This will enable you to listen to DVD audio tracks through your AV amplifier (receiver).



* The yellow plug is used for video signals (page 18).

Hints

- For correct speaker location, see the operating instructions supplied with the connected components.
- Digital audio signal can also be output when playing a VHS tape.

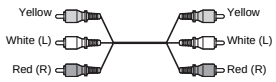
Notes

- Do not connect your TV's audio output jacks to the LINE IN (AUDIO L/R) jacks at the same time. This will cause unwanted noise to come from your TV's speakers.
- When recording a DVD, the DVD video signal is output to the DIGITAL AUDIO OUT even if you switch the output to VIDEO.

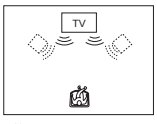
→continued

Ⓐ Connecting to audio L/R input jacks

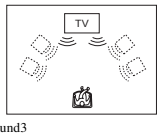
This connection will use your TV's or stereo amplifier's (receiver's) two speakers for sound. Connect using the audio/video cord (supplied).



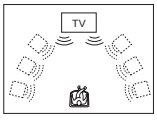
• Surround effect (page 60)
Surround1



Surround2



Surround3



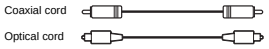
: Virtual speaker

Note

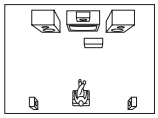
Do not connect your TV's audio output jacks to the LINE IN (AUDIO L/R) jacks at the same time. This will cause unwanted noise to come from your TV's speakers.

Ⓑ Connecting to a digital audio input jack

If your AV amplifier (receiver) has a Dolby*1 Digital or DTS*2 decoder and a digital input jack, use this connection.
Connect using a coaxial or optical digital cord (not supplied).



• Surround effect
Dolby Digital (5.1ch), DTS (5.1ch)



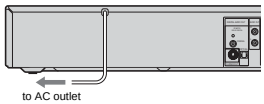
*1 Manufactured under license from Dolby Laboratories. "Dolby," "Pro Logic," and the double-D symbol are trademarks of Dolby Laboratories.
*2 "DTS" and "DTS Digital Out" are trademarks of Digital Theater Systems, Inc.

Notes

- After you have completed the connection, make the appropriate settings under "Audio Connection Setup" in Easy Setup (page 30). Otherwise, no sound or a loud noise will come from your speakers.
- The surround sound effects of this recorder cannot be used when you connect using a coaxial or optical digital cord.
- This recorder does not support Linear PCM playback with 2 channels or more.

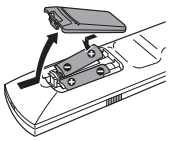
Step 5: Connecting the Power Cord

Plug the recorder and TV power cords into an AC outlet. After you connect the power cord, **you must wait for a short while before operating the recorder.** You can operate the recorder only after the front panel display lights up and the recorder enters standby mode.
If you connect additional equipment to this recorder (page 34), be sure to connect the power cord only after all connections are complete.



Step 6: Preparing the Remote

You can control the recorder using the supplied remote. Insert two size AA (R6) batteries by matching the ⊕ and ⊖ ends on the batteries to the markings inside the battery compartment. When using the remote, point it at the remote sensor on the recorder.



Notes

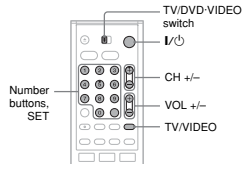
- If the supplied remote interferes your other Sony DVD Player/Video Cassette Recorder or Video Cassette Recorder/DVD Recorder, change the command mode number for this recorder (page 29).
- Use the batteries correctly to avoid possible leakage and corrosion. Do not touch the liquid with bare hands should leakage occur. Observe the following:
  – Do not use a new battery with an old battery, or batteries of different manufacturers.
  – Do not attempt to recharge the batteries.
  – If you do not intend to use the remote for an extended period of time, remove the batteries.
  – If battery leakage occurs, wipe out any liquid inside the battery compartment, and insert new batteries.
- Do not expose the remote sensor (marked on the front panel) to strong light, such as direct sunlight or lighting apparatus. The recorder may not respond to the remote.
- With normal use, the batteries should last about three to six months.
- Do not leave the remote in an extremely hot or humid place.
- Do not drop any foreign object into the remote casing, particularly when replacing the batteries.

Controlling TVs with the remote

You can adjust the remote control's signal to control your TV.
If you connected the recorder to an AV amplifier (receiver), you can also use the supplied remote to control the AV amplifier's (receiver's) volume.

Notes

- Depending on the connected unit, you may not be able to control your TV or AV amplifier (receiver) with some or all of the buttons below.
- If you enter a new code number, the code number previously entered will be erased.
- When you replace the batteries of the remote, the code number may be reset to the default setting. Set the appropriate code number again.



1 Slide the TV/DVD·VIDEO switch to TV.

2 Hold down I/⏻.

3 Enter your TV's manufacturer code (see below) using the number buttons.

4 Release I/⏻.
When the TV/DVD·VIDEO switch is set to TV, the remote performs the following:

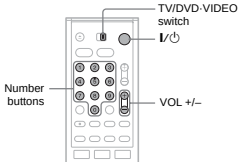
Press	To
I/⏻	Turn your TV on or off
VOL +/–	Adjust the volume of your TV
CH +/–	Select the channel on your TV
TV/VIDEO	Switch your TV's input source
Number buttons and SET	Select the channel on your TV

Code numbers of controllable TVs
If more than one code number is listed, try entering them one at a time until you find the one that works with your TV.

Manufacturer	Code number
Sony	01 (default)
Akai	04
AOC	04
Centurion	12
Coronado	03
Curtis-Mathes	12, 14
Daewoo	04, 22
Daytron	03, 12
Fisher	11
General Electric	04, 06, 10
Hitachi	02, 03, 04
J.C.Penney	04, 10, 12
JVC	09
KMC	03
LG/Gold Star	03, 04, 17
Magnavox	03, 04, 08, 12, 21
Marantz	04, 13
MGA/Mitsubishi	04, 12, 13, 17
NEC	04, 12
Panasonic	06, 19
Philco	02, 03, 04, 08
Philips	08, 21
Pioneer	06, 16
Portland	03
Proscan	10
Quasar	06, 18
Radio Shack	05, 10, 14
RCA	04, 10
Sampo	12
Samsung	03, 04, 12, 20
Sanyo	11, 14
Scott	12
Sears	07, 10, 11
Sharp	03, 05, 18
Sylvania	08, 12
Teknika	03, 08, 14
Toshiba	07, 18
Wards	03, 04, 12
Yorx	12
Zenith	14, 15

→continued

Controlling the volume of your AV amplifier (receiver) with the remote



1 Slide the TV/DVD·VIDEO switch to DVD·VIDEO.

2 Hold down I/⏻, and enter the manufacturer code (see the table below) for your AV amplifier (receiver) using the number buttons.

3 Release I/⏻.
The VOL +/– buttons control the AV amplifier's volume.
If you want to control the TV's volume, slide the TV/DVD·VIDEO switch to TV.

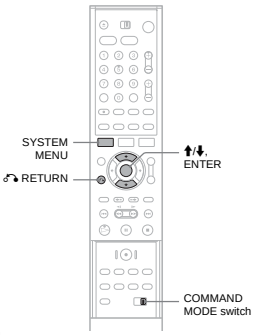
Hint
If you want to control the TV's volume even when the TV/DVD·VIDEO switch is set to DVD·VIDEO, repeat the steps above and enter the code number 90 (default).

Code numbers of controllable AV amplifiers (receivers)
If more than one code number is listed, try entering them one at a time until you find the one that works with your AV amplifier (receiver).

Manufacturer	Code number
Sony	78, 79, 80, 91
Denon	84, 85, 86
Kenwood	92, 93
Onkyo	81, 82, 83
Pioneer	99
Sansui	87
Technics	97, 98
Yamaha	94, 95, 96

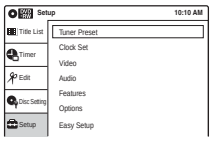
If you have a Sony DVD Player/Video Cassette Recorder or Video Cassette Recorder/DVD Recorder

If the supplied remote interferes with your other Sony DVD Player/Video Cassette Recorder or Video Cassette Recorder/DVD Recorder, set the command mode number for this recorder and the supplied remote to one that differs from the other Sony DVD Player/Video Cassette Recorder or Video Cassette Recorder/DVD Recorder.
The default command mode setting for this recorder and the supplied remote is DVD COMBO3.

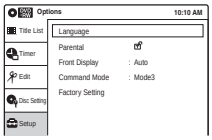


1 Press SYSTEM MENU.
The System Menu appears.

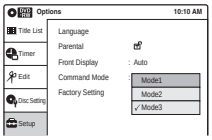
2 Select "Setup," and press ENTER.



3 Select "Options," and press ENTER.



4 Select "Command Mode," and press ENTER.



5 Select the command mode ("Mode1," "Mode2," or "Mode3"), and press ENTER.

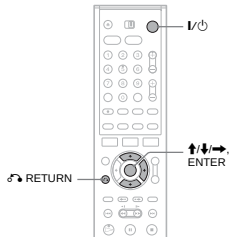
6 Slide the COMMAND MODE switch on the remote so it matches the mode you selected above.

To return to the previous display
Press ↩ RETURN.

Step 7: Easy Setup

Follow the steps below to make the minimum number of basic adjustments for using the recorder. If you do not complete Easy Setup, it will appear each time you turn on your recorder. Settings are made in the following order.

OSD Language Setup
↓
Clock Setup
↓
Tuner and Channel Setup
↓
TV Type Setup
↓
Audio Connection Setup
↓
Finished!

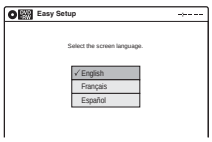


1 Turn on the TV.

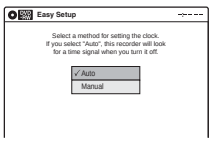
2 Press I/⏻.
The recorder turns on.

3 Switch the input selector on your TV so that the signal from the recorder appears on your TV screen.
When connecting the recorder to the TV using only the antenna cable, see "Setting the RF Output channel" on page 19.
"Initial setting necessary to operate the DVD recorder will be made. You can change them later using Setup." appears.
- If this message does not appear, select "Easy Setup" in the "Setup" display to run Easy Setup (page 107).

4 Press ENTER.
The setup display for selecting the language used in the on-screen display appears.



5 Select a language, and press ENTER.
The setup display for clock setting appears.

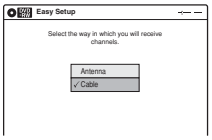

Easy Setup
Select a method for setting the clock.
If you select "Auto", this recorder will look for a time signal when you turn it off.
✓ Auto
Manual

6 Select "Auto," and press ENTER.

The recorder will automatically search for a channel that carries a time signal when you turn off the recorder after finishing Easy Setup.

- If broadcasters in your area are not yet sending time signals, select "Manual," and press ENTER. Press ↑/↓ to set the month and press →. Set the day, year, hour, minutes, and AM/PM in the same way. The day of the week is set automatically.

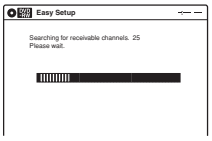
7 Select whether or not you have a cable connection.



If you use an antenna only (no cable TV), select "Antenna."
If you use a cable connection without a cable box, select "Cable."

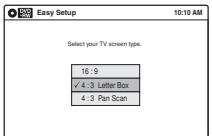
8 Press ENTER.

The Tuner Preset function automatically starts searching for all of the receivable channels and presets them.



To set the channels manually, see page 98.
After the Tuner Preset is finished, the setup display for selecting the aspect ratio of the connected TV appears.

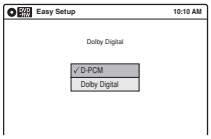
9 Select the setting that matches your TV type.



"4:3 Letter Box": For standard TVs. Displays "wide screen" pictures with bands on the upper and lower sections of the screen.
"4:3 Pan Scan": For standard TVs. Automatically displays "wide screen" pictures on the entire screen and cuts off the sections that do not fit.
"16:9": For wide-screen TVs or standard TVs with a wide screen mode.
For details, see "Video Settings (Video)" on page 100.

10 Press ENTER.

The setup display for selecting the type of Dolby Digital signal appears.

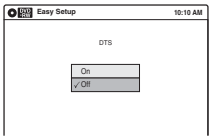


11 Select the type of Dolby Digital signal you want to send to your amplifier (receiver).

If your AV amplifier (receiver) has a Dolby Digital decoder, select "Dolby Digital." Otherwise, select "D-PCM."

12 Press ENTER.

The setup display for selecting the type of DTS signal appears.



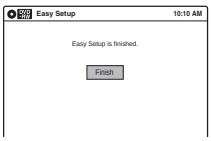
→continued

13 Select whether or not you want to send a DTS signal to your amplifier (receiver), and press ENTER.

If your AV amplifier (receiver) has a DTS decoder, select "On." Otherwise, select "Off."

14 Press ENTER when "Finish" appears.

Easy Setup is finished. All connections and setup operations are complete.



To return to the previous display

Press ↶ RETURN.

Hint

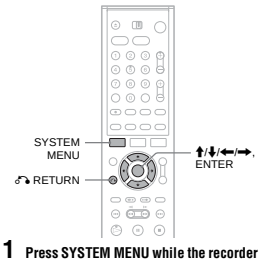
If you want to run Easy Setup again, select "Easy Setup" in the "Setup" display (page 107).

Note

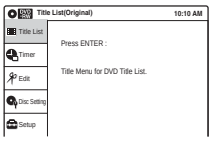
To record TV programs using the timer, you must set the clock accurately.

Setting Up the VCR Plus+® System

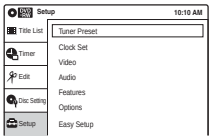
Setting up your recorder involves coordinating the TV channel number (the number you turn to on your TV or recorder to watch a program) with the guide channel (the number that's assigned to that channel in your TV program guide).
To find the guide channel numbers, look at the "Channel Line-up Chart" in the program guide for your area that features VCR PlusCode numbers. Use the Channel Line-up Chart to coordinate the guide channel number with the TV channel number. For example, if HBO is listed in the Channel Line-up Chart as channel 33, and the recorder receives HBO on channel 5, coordinate these numbers using the following procedure.



1 Press SYSTEM MENU while the recorder is stopped.



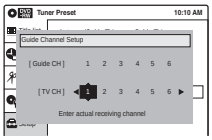
2 Select "Setup," and press ENTER.



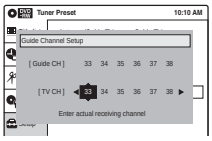
3 Select "Tuner Preset," and press ENTER.

4 Select "Guide Channel Setup," and press ENTER.

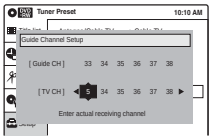
The upper row shows VCR Plus+ guide channels assigned in the program guide and the lower row shows TV channels or cable box or satellite receiver out put channels.



5 Select the channel number that does not match the guide channel using ←/→.



6 Enter the TV channel number using ↑/↓.



If you made Hookup A (page 16) or Hookup C (page 17) enter the actual channel number on your TV (and the recorder).
If you made Hookup B (page 17) enter the cable box output channel (Usually 2ch, 3ch, or 4ch). See the instructions supplied with your cable box to confirm the cable box's output channel.

7 Repeat steps 5 and 6 for each guide channel number that does not match the TV channel number.

8 Press SYSTEM MENU to exit the menu.

To return to the previous display

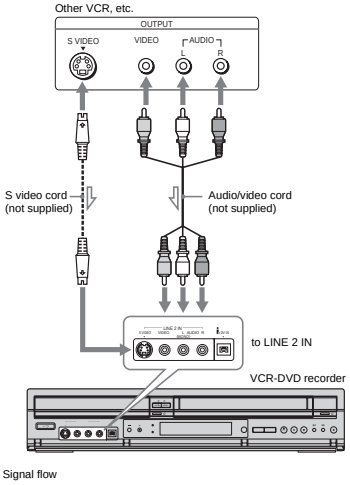
Press ↶ RETURN.

Connecting Another VCR or Similar Device

After disconnecting the recorder's power cord from an AC outlet, connect other VCR or similar recording device to the LINE IN jacks of this recorder.
See also the instruction manual supplied with the connected equipment.
To record on this recorder, see "Recording from Connected Equipment with a Timer (Synchro Rec)" on page 53 and page 72. Connect the equipment to the LINE 1 IN jacks of the recorder to record using the Synchro Rec function.

Connecting to the LINE 2 IN jacks on the front panel

Connect other VCR or similar device to the LINE 2 IN jacks of this recorder. If the equipment has an S video jack, you can use an S video cord instead of an audio/video cord.
You can connect a second DVD player and record DVDs.

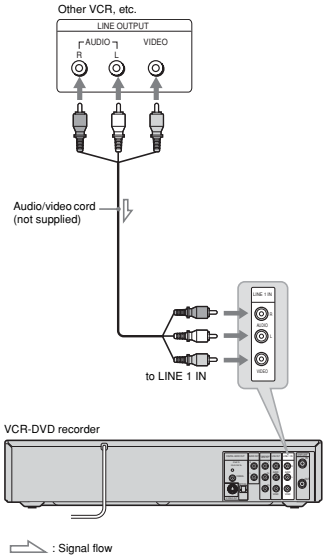


Note

You cannot record DVD video that contains a copy guard signal played back by another DVD player to a disc in this recorder.

Connecting to the LINE 1 IN jacks

You can connect a second VCR or similar device.



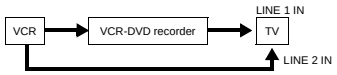
Hint

When the connected equipment outputs only monaural sound, use audio cables that distribute monaural sounds to left/right channels (not supplied).

Notes

- Do not connect the yellow LINE IN (VIDEO) jack when using an S video cord.
- Do not connect the output jack of this recorder to another equipment's input jack with the other equipment's output jack connected to the input jack of this recorder. Noise (feedback) may result.
- Pictures containing copy protection signals that prohibit any copying cannot be recorded.
- If you pass the recorder signals via the VCR, you may not receive a clear image on your TV screen.

Be sure to connect your VCR to the VCR-DVD recorder and your TV in the order shown below. To watch video tapes, watch the tapes through a second Line input on your TV.



- If you disconnect the recorder's power cord, you will not be able to view the signals from the connected VCR.
- Do not connect more than one type of video cord between the recorder and your TV at the same time.

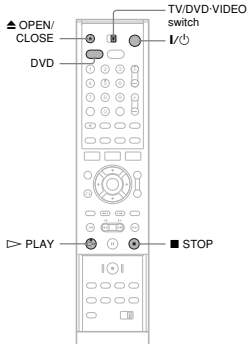
→continued 35 36

Basic Operation

Playing a DVD Disc or VHS Tape

Playing a DVD disc

+RW -RWVR -RWVideo +R -R DVD



1 Turn on the TV.

2 Press I/⏻.
The recorder turns on.

3 Switch the input selector on your TV so that the signal from the recorder appears on the TV screen.
When connecting the recorder to the TV using only the antenna cable, see "Setting the RF Output channel" on page 19.

4 Slide the TV/DVD·VIDEO switch to DVD·VIDEO, then press DVD to control the DVD recorder.

5 Press ⏏ OPEN/CLOSE, and place a disc on the disc tray.

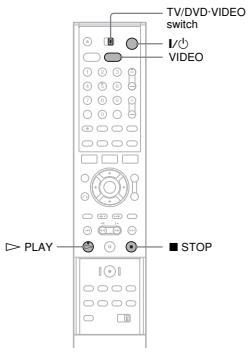
6 Press ⏏ OPEN/CLOSE to close the disc tray.
Wait until "LOAD" disappears from the front panel display.
Playback starts automatically depending on the disc.

7 Press ▷ PLAY.

To stop playback
Press ■ STOP.

Playing a VHS tape

VHS



→continued 37 38

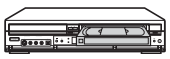
1 Turn on the TV.

2 Press I/⏻.
The recorder turns on.

3 Switch the input selector on your TV so that the signal from the recorder appears on the TV screen.
When connecting the recorder to the TV using only the antenna cable, see "Setting the RF Output channel" on page 19.

4 Slide the TV/DVD·VIDEO switch to DVD·VIDEO, then press VIDEO to control the VCR.

5 Insert a tape.
The VCR starts playing automatically if you insert a tape with its safety tab removed.



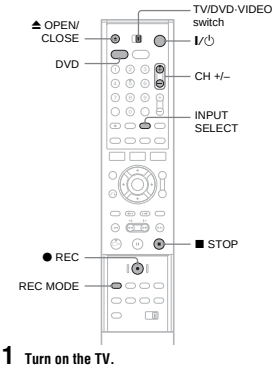
6 Press ▷ PLAY.

To stop playback
Press ■ STOP.

Recording a Program to a DVD Disc

+RW -RWVR -RWVideo +R -R

The following explains how to record a current TV program to a DVD disc.



1 Turn on the TV.

2 Press I/⏻.
The recorder turns on.

3 Switch the input selector on your TV so that the signal from the recorder appears on the TV screen.
When connecting the recorder to the TV using only the antenna cable, see "Setting the RF Output channel" on page 19.

4 Slide the TV/DVD·VIDEO switch to DVD·VIDEO, then press DVD to control the DVD recorder.

5 Press ⏏ OPEN/CLOSE, and place a recordable disc on the disc tray.

With the playback side facing down

6 Press ⏏ OPEN/CLOSE to close the disc tray.
Wait until "LOAD" disappears from the front panel display.
Unused DVD-RWs are formatted in VR mode automatically.
To format in Video mode, see page 43.

7 Press CH +/– or INPUT SELECT to select the channel or input source you want to record.

8 Press REC MODE repeatedly to select the recording mode.
Each time you press the button, the display changes on the TV screen as follows:

HQ → HSP → SP → LP → EP → SLP

For more details about the recording mode, see page 47.

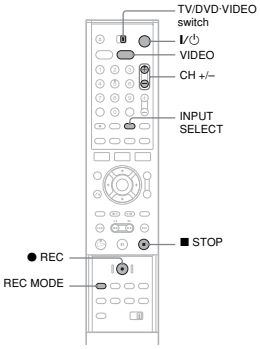
9 Press ● REC.
"REC" appears in the front panel display and recording starts.
Recording continues until you stop the recording or the disc is full.

To stop recording
Press ■ STOP.
Note that it may take a few seconds for the recorder to stop recording.

Hint
This recorder can record on various discs. Select the disc type according to your needs (page 10).

Recording a Program to a VHS Tape

VHS



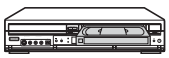
1 Turn on the TV.

2 Press I/⏻.
The recorder turns on.

3 Switch the input selector on your TV so that the signal from the recorder appears on the TV screen.
When connecting the recorder to the TV using only the antenna cable, see "Setting the RF Output channel" on page 19.

4 Slide the TV/DVD·VIDEO switch to DVD·VIDEO, then press VIDEO to control the VCR.

5 Insert a tape with its safety tab in place.



6 Press CH +/– or INPUT SELECT to select the channel or input source you want to record.

→continued

7 Press REC MODE repeatedly to select the tape speed, "SP" or "EP."
"EP" (Extended Play) provides recording time three times as long as "SP" (Standard Play). However, "SP" produces better picture and audio quality.

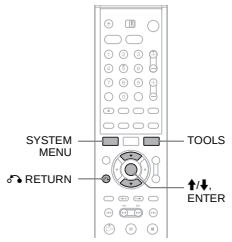
8 Press ● REC.
"REC" appears in the front panel display and recording starts.
Recording continues until you stop the recording or the tape reaches the end.

To stop recording
Press ■ STOP.

Using the On-Screen Menus

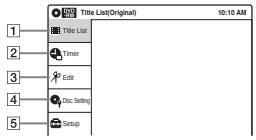
+RW -RWVR -RWVideo +R -R DVD VCD CD DATA CD VHS

This section introduces the System Menu, TOOLS menu, and sub-menu. By using these displays, you can perform most of the recorder's operations.



System Menu

The System Menu appears when you press SYSTEM MENU, and provides entries to all of the recorder's main functions, such as timer recording and setup.
Select an option by pressing ↑/↓ and ENTER.



1 "Title List" (page 42):
Press ENTER to display the "Title List" menu, which shows recorded titles on the disc.

2 "Timer" (pages 50, 69):
Allows you to set a new timer recording setting.
You can also display the Timer List menu, which allows you to check, change, or cancel timer settings.

3 "Edit" (page 81):
Allows you to create and edit a Playlist (DVD-RW in VR mode only), record a DV format tape onto a disc, dub from a DVD disc to a VHS tape and dub from a VHS tape to a DVD disc.

4 "Disc Setting" (page 43):
Allows you to format or finalize a DVD.

5 "Setup" (page 96):
Turns on the "Setup" display, which allows you to set up the recorder to suit your preferences.

Selectable options

The options that can be selected differ according to the media.
In addition, the options that can be selected also differ according to the operating mode and the disc condition.

Example: When a disc or a VHS tape is in stop mode.

Type	Selectable options
+RW -RWVR	
-RWVideo	*
-R +R	* *
DVD VCD	
CD DATA CD	
VHS	

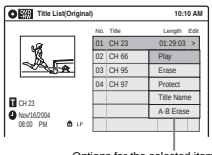
* Unfinalized disc only

Notes
- The System Menu is not displayed when recording DVD and dubbing a VHS tape to a disc.
- When the System Menu is displayed, DVD and VIDEO buttons are not available.

Sub-menu

The sub-menu appears when you select an item from a list menu (e.g. a title from the Title List menu), and press ENTER. The sub-menu displays options applicable only to the selected item. The displayed options differ depending on the situation and disc type.
Select an option by pressing ↑/↓ and ENTER.

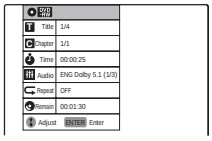
Example: The Title List menu



TOOLS

The TOOLS menu appears when you press TOOLS, and displays options. You can search for a title/chapter/track, check the playing and remaining time, or change audio and repeat settings. The displayed options differ depending on the media type.
Select the option by pressing ↑/↓ and ENTER.

Example: When you press TOOLS while a DVD-RW (VR mode) is playing.



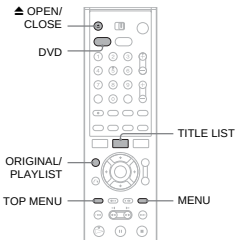
To return to the previous display
Press ↩ RETURN.

Note
The TOOLS menu may not be displayed during DVD recording.

Using the Title List

+RW -RWVR -RWVideo +R -R

The titles of programs recorded on a disc are displayed in the Title List.



1 Press DVD to control the DVD recorder.

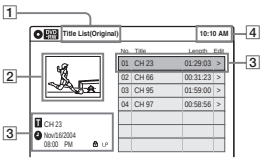
2 Press ⏏ OPEN/CLOSE, and place a disc on the disc tray.

With the recording side facing down

3 Press ⏏ OPEN/CLOSE to close the disc tray.
Wait until "LOAD" disappears from the front panel display.

4 Press TITLE LIST.

Example: DVD-RW in VR mode



1 Title type (DVD-RW in VR mode only):
Displays the title type, "Title List(Original)" or "Playlist."

2 Movie thumbnail image

3 Title information:
Displays the title number, title name, recording date, and recording mode.
"🔒" indicates the protected title.

4 Clock

About the Title List for DVD-RWs (VR mode)
You can switch the Title List to show Original or Playlist.
While the Title List menu is turned on, press ORIGINAL/PLAYLIST repeatedly to select either "Title List(Original)" or "Playlist."
For details, see "Edit options for DVD-RWs (VR mode)" on page 81.

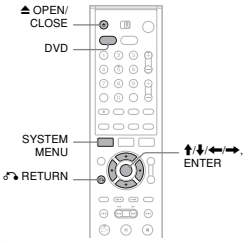
To turn off the Title List
Press TITLE LIST.

Notes
- The Title List does not appear for DVD-RW (Video mode), DVD+R, or DVD-R that have been finalized. To view a title, press TOP MENU or MENU (page 57).
- The Title List may not appear for discs created on other DVD recorders.
- Letters that cannot be displayed are replaced with an "*."
- When playback of the Title List movie thumbnail image for the selected title finishes, the thumbnail image display stops at the last image of the movie thumbnail image.

Using the DVD Disc Setting Displays

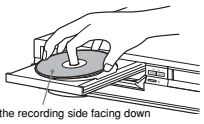
+RW -RWVR -RWVideo +R -R

With the “Disc Setting” display, you can perform operations such as formatting and finalizing (page 44).



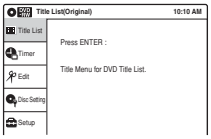
1 Press DVD to control the DVD recorder.

2 Press ⏏ OPEN/CLOSE, and place a disc on the disc tray.

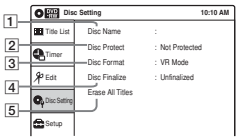

With the recording side facing down

3 Press ⏏ OPEN/CLOSE to close the disc tray.
Wait until “LOAD” disappears from the front panel display.

4 Press SYSTEM MENU while the recorder is in stop mode.



5 Select “Disc Setting,” and press ENTER.
The “Disc Setting” display appears.



6 Select an option, and press ENTER.

1 “Disc Name”:
Labels a disc. Enter the disc name in the “Disc Name” display (page 46).

2 “Disc Protect” (DVD-RW in VR mode only):
Protects all titles on the disc. To cancel the protection, select “Not protected.”

3 “Disc Format” (DVD-RW/DVD+RW only):
Erases all contents of the disc to make a blank disc. For DVD-RWs, select a recording format (“VR Mode” or “Video Mode”) according to your needs.

4 “Disc Finalize”:
Finalizes a disc (page 44).

5 “Erase All Titles” (DVD-RW/DVD+RW only):
Erases all titles on the disc (except the protected titles).

To return to the previous display
Press ↩ RETURN.

➡continued

Hints
- You can set protection for individual titles (page 82).
- By reformatting, you can change the recording format on DVD-RWs, or record again on DVD-RWs (Video mode) that have been finalized.

Note
You can enter up to 32 characters for a disc name. The disc name may not appear when the disc is played on other DVD equipment.

Finalizing a disc (preparing a disc for playback on other equipment)

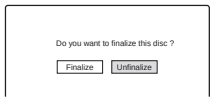
+RW -RWVR -RWVideo +R -R

Finalizing is necessary when you play discs recorded with this recorder on other DVD equipment.
When you finalize a DVD+RW, DVD-RW (Video mode), DVD+R, or DVD-R, a DVD menu will be automatically created, which can be displayed on other DVD equipment.
Before finalizing, check the differences between the disc types in the table below.

Differences between the disc types

+RW	Discs are automatically finalized when stopped recording. If you want to record on it again, reformat the disc (page 43). However, after reformatting the disc, all recorded contents will be erased.
-RWVR	Finalizing is unnecessary when playing a disc on VR format compatible equipment. Even if your other DVD equipment is VR format compatible, you may need to finalize the disc, especially if the recording time is short. After finalizing, you cannot edit or record on the disc. If you want to edit or record on it again, unfinalize or reformat the disc (page 43). However, after reformatting the disc, all recorded contents will be erased.
-RWVideo	Finalizing is necessary when playing on any equipment other than this recorder. After finalizing, you cannot edit or record on the disc. If you want to edit or record on it again, unfinalize or reformat the disc (page 43). However, after reformatting the disc, all recorded contents will be erased.
+R -R	Finalizing is necessary when playing on any equipment other than this recorder. After finalizing, you cannot edit or record on the disc.

1 Follow steps 1 to 6 of “Using the DVD Disc Setting Displays” on page 43 to select “Disc Finalize” in the “Disc Setting” display.
The display for confirmation appears.



2 Select “Finalize,” and press ENTER.
The display for confirmation appears again.

3 Select “OK,” and press ENTER.
The recorder starts finalizing the disc.

To unfinalize a DVD-RW (VR mode)
If you cannot record or edit on a DVD-RW (VR mode) that has been finalized with other DVD equipment (a message appears), unfinalize the disc by selecting “Unfinalize” in step 2 above.

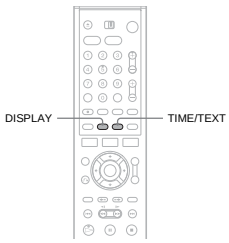
Hint
You can check whether the disc has been finalized or not. If you cannot select “Finalize” in step 2 above, the disc has already been finalized.

Notes
- Depending on the condition of the disc, recording, or the DVD equipment, discs may not play even if the discs are finalized.
- The recorder may not be able to finalize the disc if it was recorded on another recorder.

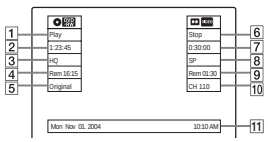
Checking the Play Information and Playing Time

+RW -RWVR -RWVideo +R -R DVD VCD CD DATA CD VHS

You can check the playing time and remaining time of the current title, chapter, or track.



Press DISPLAY.
The information display appears.
The display disappears after a short time.



◆ DVD
1 Play mode
2 Playing time
3 Recording mode
4 Remaining time
5 Current channel*

* Title type (Original or Playlist) for DVD-RW in VR mode

◆ VHS
6 Play mode
7 Time counter
8 Recording mode
9 Remaining time
10 Current channel
11 Date and time

Note
The information display may not be displayed during DVD recording.

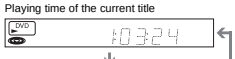
Checking the playing/remaining time

You can view the playing or time information displayed on the TV screen and the front panel display.

Press TIME/TEXT repeatedly.
The displays differ depending on the media type or playing status.

◆ Front panel display
Example: When playing a DVD

Playing time of the current title



Current title number and current chapter number

Clock

Example: When playing a CD

Playing time of the current track
⬇
Current track number
⬇
Clock

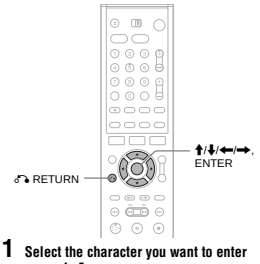
Example: When playing a VHS tape

Playing time
⬇
Remaining time
⬇
Clock

Changing the Name of a Recorded Program (Title Input)

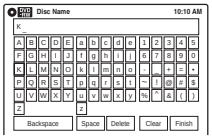
+RW -RWVR -RWVideo +R -R

You can label a title, disc, or program by entering characters. You can enter up to 32 characters for a title or disc name, but the actual number of characters displayed in the menus such as the Title List will vary. When the display for entering characters appears, follow the steps below.



1 Select the character you want to enter using ↑/↓/←/→, and press ENTER.
The selected character appears at the top of the display.

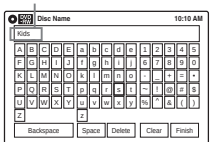
Example: Disc Name



You can only enter characters and symbols that are displayed.

To insert a space, select “Space.”

2 Repeat step 1 to enter the remaining characters.
Input row



To erase a character, move the cursor to the right of the character at the input row. Select “Backspace” and press ENTER.
To erase the character at the position of the cursor, select “Delete” and press ENTER.

To insert a character, move the cursor to the right of the point where you want to insert the character. Select the character and press ENTER.

To erase all of the characters, select “Clear” and press ENTER.

3 Select “Finish,” and press ENTER.
To cancel the setting, press ↩ RETURN.

Before Recording

Before you start recording…

- This recorder can record on various discs. Select the disc type according to your needs (page 10).
- Check that the disc has enough available space for the recording (page 50). For DVD-RWs, you can free up disc space by erasing titles (page 82).

Hint

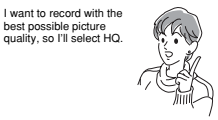
Timer recordings will start regardless of whether or not the recorder is turned on. You cannot turn off the recorder during a timer recording. The recorder automatically turns off after the timer recording finishes.

Notes

- This recorder records at x1 speed.
- This recorder shares a single tuner for both the DVD recorder and the VCR. You cannot record different programs to a DVD and a VHS tape at the same time.

Recording mode

Like the SP or EP recording mode of VCRs, this recorder has six different recording modes. Select a recording mode according to the time and picture quality you need. For example, if picture quality is your top priority, select the High Quality mode (HQ). If recording time is your priority, Super Long Play mode (SLP) can be a possible choice. Note that the recording time in the following table is an approximate guide.
Press REC MODE repeatedly to switch the recording modes.



Recording mode	Recording time (minute)
HQ (High quality)	60
HSP ↑	90
SP (Standard mode)	120
LP ↓	180
EP ↓	240
SLP (Long duration)	360

Note

Situations below may cause slight inaccuracies with the recording time.
– Recording a program with poor reception, or a program or video source of low picture quality
– Recording on a disc that has already been edited
– Recording only a still picture or just sound

Recording a stereo/SAP program

The recorder can receive and record stereo/SAP programs.

Stereo programs

When a stereo program is received, the "STEREO" indicator lights up in the front panel display. If there is noise in the stereo program, press AUDIO repeatedly until the "MONO" indicator disappears from the TV screen. The sound will be recorded in monaural but with less noise.

SAP (Second Audio Program)

When a SAP (Second Audio Program) is received, the "SAP" indicator lights up in the front panel display. To record only SAP sound, set "Tuner Audio" of "Audio" to "SAP" in the "Setup" display (page 102).

Unrecordable pictures

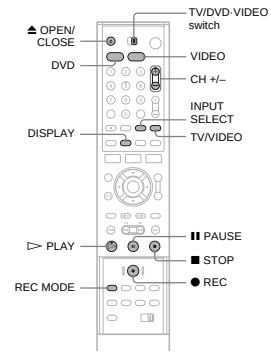
Pictures with copy protection cannot be recorded on this recorder.

Copy control signals	Recordable discs
Copy-Free	+RW -RWVR -RWVideo +R -R
Copy-Once	-RWVR Ver.1.1 with CPRM* Ver.1.2 with CPRM*
Copy-Never	None

* The recorded disc can be played only on CPRM compatible equipment.
Recording stops when a copy guard signal is detected.

DVD Recording without the Timer

+RW -RWVR -RWVideo +R -R



1 Press DVD to control the DVD recorder.

2 Press ≜ OPEN/CLOSE, and place a recordable disc on the disc tray.

3 Press ≜ OPEN/CLOSE to close the disc tray.
Wait until "LOAD" disappears from the front panel display.
Unused DVD-RWs are formatted in VR mode automatically.
To format in Video mode, see page 43.

4 Press CH +/– or INPUT SELECT to select the channel or input source you want to record.

➞continued

5 Press REC MODE repeatedly to select the recording mode.
Each time you press the button, the display changes on the TV screen as follows:

HQ → HSP → SP → LP → EP → SLP

For more details about the recording mode, see page 47.

6 Press ● REC.
Recording starts.
Recording continues until you stop the recording or the disc is full.

To stop recording

Press ■ STOP.
Note that it may take a few seconds for the recorder to stop recording.

To pause recording

Press ❚❚ PAUSE.
To restart recording, press ❚❚ PAUSE again.

To watch another TV program while recording

1 Slide the TV/DVD·VIDEO switch to TV.
2 Press TV/VIDEO to switch to the TV's antenna input.
3 Select another channel on the TV.

To watch a VHS tape while recording

Press VIDEO to control the VCR, insert a tape, then press ▷ PLAY.

Recording using the Quick Timer (One-touch Timer Recording)

You can set the recorder to record in 30 minute increments.

1 Press DVD to control the DVD recorder.

2 Press ● REC repeatedly to set the duration.
Each press advances the time in 30 minute increments. The maximum duration is six hours.

0:30 → 1:00 – - → 5:30 → 6:00 → (normal recording)

"OTR" (One-touch Timer Recording) and the remaining recording time are displayed in the front panel display while recording.
The time counter decreases minute by minute to 0:00, then the recorder stops recording (power turns off).

To cancel the Quick Timer

Press ● REC repeatedly until the counter appears in the front panel display. The recorder returns to normal recording mode.

To stop recording.

Press ■ STOP twice.

Hint

If you do not want to watch TV while recording, you can turn off the TV. When using a cable box or satellite receiver, make sure to leave it on.

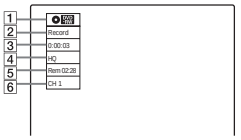
Notes

- After pressing ● REC, it may take a short while to start recording.
- You cannot change the recording mode while recording or during recording pause.
- If there is a power failure, the program you are recording may be erased.
- You cannot change the channel or input source of the recorder using CH +/– or INPUT SELECT while recording another TV program.

Checking the disc status while recording

You can check the recording information such as recording time or disc type.

Press DISPLAY during recording.
The recording information appears.



1 Disc type
2 Recording status
3 Recording time
4 Recording mode
5 Remaining recording time
6 Current channel

Press DISPLAY repeatedly to turn off the display.

Creating chapters in a title

The recorder will automatically divide a recording (a title) into chapters by inserting chapter marks at 5 or 15 minute intervals during recording. Select the interval, "5 Min" (default) or "15 Min" in "DVD Auto Chapter" of "Features" in the "Setup" display (page 104).
To cancel "DVD Auto Chapter" setting, select "Off."

Hint

You can create chapters manually when playing DVD+RWs or DVD-RWs (VR mode). For details, see page 84.

DVD Timer Recording (Standard/VCR Plus+)

+RW -RWVR -RWVideo +R -R

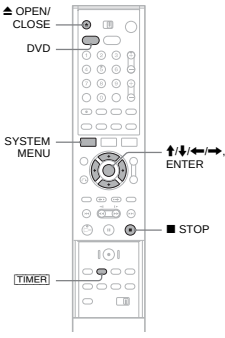
You can set the timer for a total of 12 programs together with DVD Timer Recording and VCR Timer Recording, up to one month in advance. There are two methods to set the timer: the standard method and VCR Plus+ method.

- Standard: Set the date, time, and channel of the program manually.
- VCR Plus+: Enter the PlusCode number designated for each TV program (page 52).

Note

Do not operate your cable box or satellite receiver just before or during a timer recording. This may prevent the accurate recording of a program.

Setting the timer manually (Standard)



➞continued

1 Press DVD to control the DVD recorder.

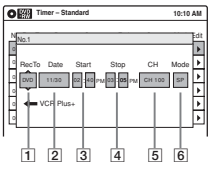
2 Press ⏏ OPEN/CLOSE, and place a recordable disc on the disc tray.

With the recording side facing down

3 Press ⏏ OPEN/CLOSE to close the disc tray.

Wait until "LOAD" disappears from the front panel display.
Unused DVD-RWs are formatted in VR mode automatically.
To format in Video mode, see page 43.

4 Press TIMER.



If the Timer programming (VCR Plus+) menu appears, press ← to switch the display to "Standard."

5 Select an item using ←/→ and adjust using ↑/↓.

1 "RecTo":
Select "DVD."

2 "Date":
Sets the date using ↑.
To record the same program every day or the same day every week, press ↓.
The item changes as follows:
Today ↔ Mon-Fri (Monday to Friday) ↔ Sun (every Sunday) ↔ Mon (every Monday) ↔ … ↔ Sat (every Saturday) ↔ 1 month later ↔ … ↔ Today

3 "Start":
Sets the start time.

4 "Stop":
Sets the stop time.

5 "CH":
Selects the channel or input source.

6 "Mode":
Selects the recording mode (page 47).
To use the Rec Mode Adjust function, select "Auto." For details, see "To use the Rec Mode Adjust function" on page 52.

If you make a mistake, select the item and change the setting.

6 Press ENTER.

The Timer List menu (page 55) appears. The ⏲ indicator lights up in the front panel display, and the recorder is ready to start recording. If the ⏲ indicator flashes in the front panel display, check that a recordable disc is inserted and that there is enough disc space for the recording.
There is no need to turn off the recorder before the timer recording starts.
If the timer settings overlap, the message "These timer settings overlap." appears. To confirm, change, or cancel timer recording, see "Checking/Changing/Canceling DVD Timer Settings (Timer List)" on page 55.

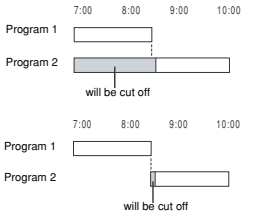
7 Press SYSTEM MENU to exit the menu.

To stop recording

Press ■ STOP twice.
Note that it may take a few seconds for the recorder to stop recording.

If the timer settings overlap

The program that starts first has priority and the second program starts recording only after the first program has finished. If the programs start at the same time, the program listed first in the menu has priority.



To confirm, change, or cancel timer recording

See "Checking/Changing/Canceling DVD Timer Settings (Timer List)" on page 55.

To use the Rec Mode Adjust function

When you are recording a program in the Auto mode and there is not enough available disc space for the recording, the recorder automatically adjust the recording mode to enable the entire program to be recorded.

Hints

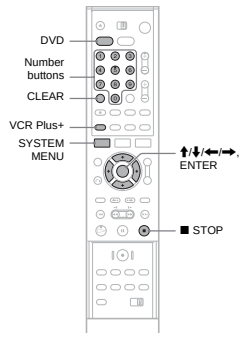
- You can play the recorded program by selecting the program title in the Title List menu.
- When the start time and the channel or input source to be recorded are the same but the "RecTo" setting differs, the program is recorded to both the DVD disc and the VHS tape.
- You can also display the Timer programming menu as follows:
  1 Press SYSTEM MENU.
  The System Menu appears.
  2 Select "Timer," and press ENTER.
  3 Select "Timer – Standard," and press ENTER.

Notes

- To record a cable or satellite program, turn on the cable box or satellite receiver and select the program you want to record. Leave the cable box or satellite receiver turned on until the recorder finishes recording.
- Even if the timer is set, timer recordings cannot be made while recording a program that has priority.
- Before the timer recording starts, "TIMER REC" flashes in the front panel display.

Recording TV programs using the VCR Plus+ system

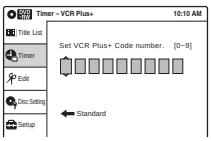
The VCR Plus+ system is a feature that simplifies setting the timer. Just enter the PlusCode number listed in the TV program guide. The date, time, and channel of that program are set automatically. Before you start, check that the TV and guide channels are correctly set in "Guide Channel Setup" of "Tuner Preset" in the "Setup" display (page 98).



1 Press DVD to control the DVD recorder.

2 Insert a recordable disc.

3 Press VCR Plus+.



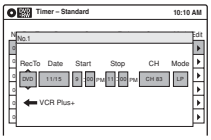
If the Timer programming (Standard) menu appears, press ← to switch the display to "VCR Plus+."

4 Press the number buttons to enter the PlusCode number.

If you make a mistake, press CLEAR and re-enter the correct number.

5 Press ENTER.

The date, start and stop times, channel, and recording mode appear.
The ⏲ indicator lights up in the front panel display, and the recorder is ready to start recording. If the ⏲ indicator flashes in the front panel display, check that a recordable disc is inserted.



6 Select "RecTo" using ←/→ and select "DVD" using ↑/↓, and press ENTER.

If you want to change other settings, press ←/→ to select the item and press ↑/↓ to change the setting.

7 Press SYSTEM MENU to exit the menu.

To stop recording

Press ■ STOP twice.
Note that it may take a few seconds for the recorder to stop recording.

If the timer settings overlap

See page 51.

To confirm, change, or cancel timer recording

See "Checking/Changing/Canceling DVD Timer Settings (Timer List)" on page 55.

Hint

You can also display the Timer programming menu as follows:
1 Press SYSTEM MENU.
The System Menu appears.
2 Select "Timer," and press ENTER.
3 Select "Timer – VCR Plus+," and press ENTER.

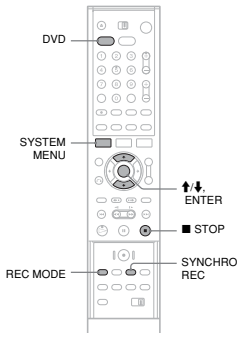
Notes

- When the PlusCode number is incorrect, "Invalid code" appears on the TV screen.
- Before the timer recording starts, "TIMER REC" flashes in the front panel display.

Recording from Connected Equipment with a Timer (Synchro Rec)

+RW -RW VR -RW Video +R -R

You can set the recorder to automatically record programs from connected equipment that has a timer function (such as a satellite tuner). Connect the equipment to the LINE 1 IN jacks of the recorder (page 35).
When the connected equipment turns on, the recorder starts recording a program from the LINE 1 IN jacks.



1 Press DVD to control the DVD recorder.

2 Insert a recordable disc.

3 Select the line input audio.

Set "Line Audio Input" of "Audio" to "Stereo" or "Main/Sub" in the "Setup" display (page 103).

4 Press REC MODE repeatedly to select the recording mode.

Each time you press the button, the display changes on the TV screen as follows:

HQ → HSP → SP → LP → EP → SLP

For more details about the recording mode, see page 47.

5 Press SYSTEM MENU while the recorder is in stop mode.

6 Select "Setup," and press ENTER.

7 Select "Features," and press ENTER.

The "Features" setup appears.

8 Select "Synchro Recording," and press ENTER.

9 Select "to DVD," and press ENTER.

10 Press SYSTEM MENU to exit the menu.

11 Set the timer on the connected equipment to the time of the program you want to record, and turn it off.

12 Press SYNCHRO REC.

The SYNCHRO REC indicator lights up on the front panel. The recorder is ready to start Synchro-Recording.
The recorder automatically starts recording when it receives an input signal from the connected equipment. The recorder stops recording when the connected equipment turns off.

To stop recording

Press ■ STOP twice.

To cancel Synchro Rec function

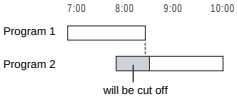
Press SYNCHRO REC. The SYNCHRO REC indicator on the recorder turns off.
If you press SYNCHRO REC during Synchro-Recording, the Synchro-Recording stops, the SYNCHRO REC indicator turns off and the recorder's power turns off.

Notes

- The recorder starts recording only after detecting the video signal from the connected equipment. The beginning of the program may not be recorded regardless of whether or not the recorder's power is on or off.
- During Synchro-Recording, other operations such as normal recording cannot be done.
- To use the connected equipment while the recorder is standing by for Synchro-Recording, cancel Synchro-Recording by pressing SYNCHRO REC. Be sure to turn off the connected equipment and press SYNCHRO REC to reset Synchro-Recording before the timer recording starts.
- The Synchro Rec function does not work with some tuners. For details, see the tuner's operating instructions.
- While the recorder is standing by for Synchro-Recording, the Auto Clock Set function (page 99) does not work.
- To use the Synchro Rec function, you must first set the recorder's clock correctly.
- When the recorder's power is on, the recorder enters the Synchro-Recording standby mode after a Synchro-Recording has finished.

If the timer settings of a Synchro-Recording and another timer recording overlap

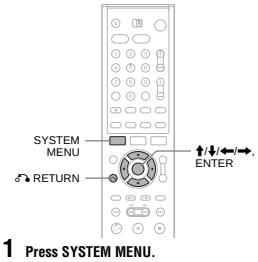
Regardless of whether or not the program is a Synchro Rec program, the program that starts first has priority. The recorder switches to start recording the second program around 10 seconds after the first program has finished.



Checking/Changing/Canceling DVD Timer Settings (Timer List)

+RW -RWVR -RWVideo +R -R

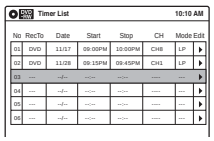
You can check, change, or cancel timer settings using the Timer List menu.



1 Press SYSTEM MENU.
The System Menu appears.

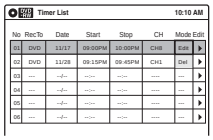
2 Select "Timer," and press ENTER.

3 Select "Timer List," and press ENTER.

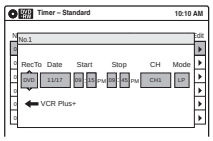

Timer List
10:10 AM
No RecTo Date Start Stop CH Mode Edit
01 DVD 11/17 09:00PM 10:00PM CH8 LP
02 DVD 11/28 09:15PM 09:45PM CH11 LP
03 --- --/-- --:-- --:-- --- ---
04 --- --/-- --:-- --:-- --- ---
05 --- --/-- --:-- --:-- --- ---
06 --- --/-- --:-- --:-- --- ---

Timer information displays the recording date, time, recording mode, etc.

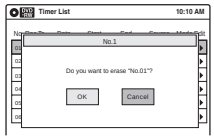
4 Select the timer setting you want to check/change/cancel, and press ENTER.
The sub-menu appears.


Timer List
10:10 AM
No RecTo Date Start Stop CH Mode Edit
01 DVD 11/17 09:00PM 10:00PM CH8 Edit
02 DVD 11/28 09:15PM 09:45PM CH11 Del
03 --- --/-- --:-- --:-- --- ---
04 --- --/-- --:-- --:-- --- ---
05 --- --/-- --:-- --:-- --- ---
06 --- --/-- --:-- --:-- --- ---

5 Select one of the options, and press ENTER.
"Edit": Changes the timer setting. Select an item using ←/→ and adjust using ↑/↓. Press ENTER.



"Del": Erases the timer setting. Press ENTER.



To turn off the Timer List
Press ↩ RETURN.

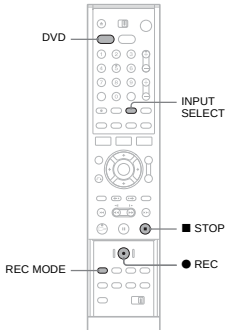
Note
Even if the timer is set, timer recordings cannot be made while recording a program that has priority.

DVD Recording

Recording from Connected Equipment without a Timer

+RW -RWVR -RWVideo +R -R

You can record from a connected VCR or similar device. To connect other VCR or similar device, see "Connecting Another VCR or Similar Device" on page 34.
Use the DV IN jack on the front panel if the equipment has a DV output jack (i.LINK jack).



1 Press DVD to control the DVD recorder.

2 Insert a recordable disc.

3 Press INPUT SELECT to select an input source according to the connection you made.
The front panel display changes as follows:

program position → LINE1 → LINE2 → DV

4 Press REC MODE repeatedly to select the recording mode.
Each time you press the button, the display changes on the TV screen as follows:

HQ → HSP → SP → LP → EP → SLP

For more details about the recording mode, see page 47.

5 Select the line input audio.
Set "Line Audio Input" of "Audio" to "Stereo" or "Main/Sub" in the "Setup" display (page 103).

6 Insert the source tape into the connected equipment and set to playback pause.

7 At the same time, press ● REC on this recorder and the pause or play button on the connected equipment.
Recording starts.
To stop recording, press ■ STOP on this recorder.

If you connect a digital video camera with a DV IN jack
See "Dubbing from a DV Format Tape to a DVD" on page 94 for an explanation of how to record from the DV IN jack.

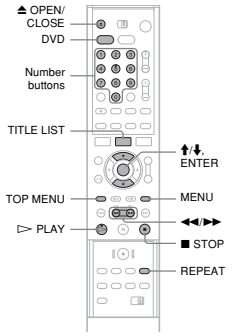
Notes
- When recording a video game image, the screen may not be clear.
- Any program that contains a Copy-Never copy guard signal cannot be recorded. The recorder automatically stops recording after a few seconds.

55 56

Playing Discs

Playing

+RW -RWVR -RWVideo +R -R DVD VCD CD DATA CD



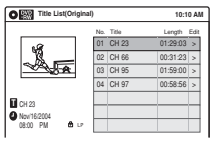
1 Press DVD to control the DVD recorder.

2 Press ▲ OPEN/CLOSE, and place a disc on the disc tray.

With the playback side facing down

3 Press ▲ OPEN/CLOSE to close the disc tray.
If you inserted a DVD VIDEO, VIDEO CD, CD, or DATA CD, press ▷ PLAY. Playback starts.
Playback starts automatically depending on the disc.

4 Press TITLE LIST.
For details about the Title List, see "Using the Title List" on page 42.
Example: DVD-RW (VR mode)



5 Select the title, and press ENTER.
The sub-menu appears.

6 Select "Play," and press ENTER.
Playback starts from the selected title on the disc.

To use the DVD's Menu
When you play a DVD VIDEO, or a finalized DVD+RW, DVD-RW (Video mode), DVD+R, or DVD-R, you can display the disc's menu by pressing TOP MENU or MENU.

To play VIDEO CDs with PBC functions
PBC (Playback Control) allows you to play VIDEO CDs interactively using the menu on your TV screen.
When you start playing a VIDEO CD with PBC functions, the menu appears.
Select an item using the number buttons and press ENTER. Then follow the instructions in the menu (press ▷ PLAY when "Press SELECT" appears).

To cancel PBC Playback
Press MENU repeatedly until "Menu: Off" appears.

To stop playback
Press ■ STOP.

Playing Discs

To resume playback from the point where you stopped the disc (Resume Play)
When you press ▷ PLAY again after you stop the disc, the recorder resumes playback from the point where you pressed ■ STOP.
To start from the beginning, press ■ STOP twice, and press ▷ PLAY.

The point where you stopped playing is cleared when:
– you open the disc tray.
– you play another title.
– you switch the Title List menu to Original or Playlist (DVD-RW in VR mode only).
– you edit the title after stopping playback.
– you turn off the recorder.
– you make a recording.

To repeat a specific portion (Repeat A-B Play) (DVD and VIDEO CD (with PBC function off) only)

1 During playback, press REPEAT.

2 Select "A" using ↑/↓.

3 Press ENTER at the starting point (point A) of the portion to be played repeatedly.
"A-" lights up.

4 Continue playing or press ◀◀/▶▶ to locate the ending point (point B), then press ENTER.
Repeat A-B Play starts.

To play restricted DVDs (Parental Control)
If you play a restricted DVD, the message "Your selection exceeds the rating limit for this player. Override the limit?" appears on your TV screen.

1 Select "OK" and press ENTER.
The display for entering your password appears.

2 Enter your four digit password using the number buttons.
The recorder starts playback.

To register or change the password, see "Parental (DVD VIDEO only)" on page 105.

To lock the recorder (Child Lock)
You can lock all of the buttons on the recorder so that the settings are not canceled by mistake. When the recorder is turned on, hold down I/⏻ on the recorder until "CHILD LOCK" appears in the front panel display. The recorder turns off and the ◴ indicator remains lit if there is a timer setting. The recorder will not work except for timer recordings.

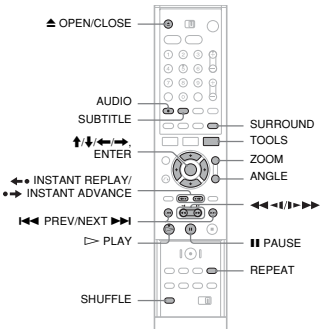
To unlock the recorder, hold down I/⏻ on the recorder until "CHILD LOCK" disappears from the front panel display. The recorder is unlocked and turns on.

To stop timer recording while the recorder is locked, press ■ twice. The recording stops and the recorder is unlocked.

Notes
- When playing back a disc recorded by other equipment on this recorder, be sure to finalize the disc with the equipment used to record it.
- For details on the operation restrictions, see page 8.
- The recorder will be unlocked when:
  – You stop timer recording by pressing ■.
  – You insert a tape.
  – The AC power cord is disconnected or power supply stops.

→continued 57 58

Playback options



Buttons	Operations	Discs
⏏ OPEN/CLOSE	Stops play and opens the disc tray.	All discs
AUDIO	Selects one of the audio tracks recorded on the disc when pressed repeatedly. DVD Selects the audio source. VCD Selects stereo or monaural audio tracks.	DVD VCD
SUBTITLE	Selects a subtitle language when pressed repeatedly.	DVD
ANGLE	Selects an angle when pressed repeatedly. If various angles (multi-angles) for a scene are recorded on the disc, " " appears in the front panel display.	DVD
ZOOM	Zooms into a scene during playback or still mode when pressed repeatedly. Magnification changes as follows: normal magnification → ×2 → ×4 → normal magnification The zoom function may not work depending on the DVD. To zoom in a JPEG image, see page 65.	DVD VCD

Buttons	Operations	Discs
SURROUND	Selects one of the effects when pressed repeatedly. "Off": No surround effect "Surround1": Creates one set of virtual surround speakers. "Surround2": Creates two sets of virtual surround speakers. "Surround3": Creates three sets of virtual surround speakers. Effective when you use two separate front speakers.	+RW -RWVR -RWVideo +R -R DVD CD
←• INSTANT REPLAY/ •→ INSTANT ADVANCE	• Replays the scene/briefly fast forwards the scene when pressed in continuous play mode. • Goes to the previous/next frame when pressed in pause mode.	+RW -RWVR -RWVideo +R -R DVD
⏮ PREV/ NEXT ⏭	• Goes to the beginning of the current/next title/ chapter/scene/track and starts playback when pressed during playback. • Goes to the beginning of the previous title/chapter/ scene/track when ⏮ PREV is pressed within 3 seconds after starting a title/chapter/scene/track.	All discs
◀◀ ◂▮/▮▸ ▶▶ (fast reverse/fast forward)	Fast reverses/fast forwards the disc when pressed during playback. Search speed changes as follows: fast reverse: FR1 ← , FR2*1 ← ← , FR3*2 ← ← ← fast forward: → FF1 , → → FF2*1 , → → → FF3*2	All discs *1 FR2 and FF2 are not available for MP3. *2 FR3 and FF3 are only available for DVDs and VIDEO CDs.
◀◀ ◂▮/▮▸ ▶▶ (slow)	Plays in slow motion when pressed in pause mode. The playback speed changes as follows: reverse slow motion: ◂▮3 ← , ◂▮2 ← ← , ◂▮1 ← ← ← forward slow motion: → 3▮▸ , → → 2▮▸ , → → → 1▮▸	+RW -RWVR -RWVideo +R -R DVD VCD * * Playback direction only
❚❚ PAUSE	Pauses playback. If you pause playback for more than 5 minutes, playback starts automatically.	All discs
SHUFFLE	Plays in random order when pressed during playback.	VCD * CD DATA CD * with PBC function off

→continued 59 60

Buttons	Operations	Discs
REPEAT	Selects the item to be repeated using ↑/↓. **When playing a DVD** • Chapter: repeats the current chapter. • Title: repeats the current title on a disc. • A-B (Repeat A-B Play): repeats a specific portion (page 58). **When playing a VIDEO CD (with PBC function off)** • Track: repeats the current track. • Disc: repeats all of the tracks. • A-B (Repeat A-B Play): repeats a specific portion (page 58). **When playing a CD** • Track: repeats the current track. • Disc: repeats all of the tracks. **When playing a DATA CD (MP3 audio)** • File: repeats the current track. • Folder: repeats the current album. To cancel Repeat Play, press REPEAT, and select "Off."	+RW -RWVR -RWVideo +R -R DVD VCD * CD DATA CD * with PBC function off

To resume normal playback, press ▷ PLAY.

To playback quickly with sound (Scan Audio) (DVD with Dolby Digital sound tracks only)

Set "Scan Audio" of "Audio" to "On" in the "Setup" display (page 103).
You can then play quickly with dialog or sound during FF1 fast-forward of a DVD disc with Dolby Digital sound tracks.

Hint

You can select the audio/subtitle settings and the angle using the TV screen. Press TOOLS during playback, select "Audio," "Subtitle," or "Angle" using ↑/↓, then select the setting or angle using ←/→. Then press ENTER.

Notes

- Shuffle play will stop when all the tracks are played back.
- You cannot repeat play in the following cases:
  – while in shuffle play
  – VIDEO CDs with PBC function on.
- When the playback signal does not contain a signal for the surround speakers, the surround effects will be difficult to hear.
- When you select one of the surround modes, turn off the surround settings of the connected TV or amplifier (receiver).
- Make sure that your listening position is between and at an equal distance from your speakers, and that the speakers are located in similar surroundings.

Notes on playing DTS sound tracks on a CD

When playing DTS-encoded CDs, excessive noise will be heard from the analog stereo jacks. To avoid possible damage to the audio system, the consumer should take proper precautions when the analog stereo jacks of the recorder are connected to an amplification system. To enjoy DTS Digital Surround™ playback, an external 5.1-channel decoder system must be connected to the digital jack of the recorder.

Notes on playing DVDs with a DTS sound track

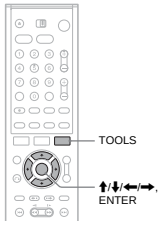
DTS audio signals are output only through the DIGITAL AUDIO OUT (COAXIAL or OPTICAL) jack.
When you play a DVD with DTS sound tracks, set "Digital Out" – "DTS" to "On" of "Audio" in the "Setup" display (page 102).

61 62

Searching for a Title/ Chapter/Track, etc.

+RW -RWVR -RWVideo +R -R DVD VCD

You can search a DVD by title or chapter, and VIDEO CD by track or scene. As titles and tracks are assigned individual numbers on the disc, select the title or track by entering its number. You can also search for a scene using the time code.



1 Press TOOLS during playback.
The TOOLS menu appears.

2 Select a search method.
"Title" (for DVDs)
"Chapter" (for DVDs)
"Track" (for VIDEO CDs with PBC function off)
"Time" (for DVDs/VIDEO CDs): Searches for a starting point by entering the time code.

3 Press ←/→ to select the number of the title, chapter, track, time code, etc., you want.
For example: Time
To find a scene at 2 hours, 10 minutes, and 20 seconds, enter "21020."
If you make a mistake, wait a bit until the display returns to the elapsed playing time display, then select another number.

4 Press ENTER.
The recorder starts playback from the selected number.

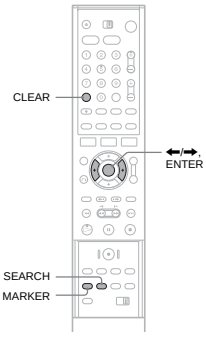
Note

Depending on the disc, you cannot use the TOOLS menu to search for a title, chapter, track, or start from a point by entering the time code.

Setting and selecting a favorite scene (Bookmark)

+RW -RWVR -RWVideo +R -R DVD

You can have the recorder store specific portions of the disc in memory and play them immediately whenever you want (Bookmark). Up to 10 bookmarks per disc.



You can play back from the bookmarked scene. During playback, press SEARCH, and select the bookmark using ←/→, then press ENTER.

To set a bookmark

During playback, press MARKER when you find a scene to be bookmarked.

To reset the bookmark

During playback, press SEARCH, and select the bookmark you want to reset using, then press ←/→, then press CLEAR.

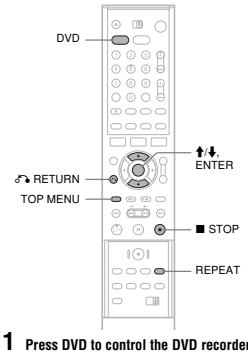
Note

When you eject the disc, the bookmark information is cleared.

Playing MP3 Audio Tracks

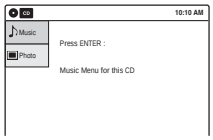
DATA CD

You can play MP3 audio tracks on DATA CDs (CD-Rs/CD-RWs).



1 Press DVD to control the DVD recorder.

2 Place a DATA CD on the disc tray.
When you load a DATA CD which contains MP3 audio tracks and JPEG image files, the display for selecting a media type appears.



If you load a DATA CD which contains only MP3 audio files, the MP3 display appears. Then you can skip step 3.

3 Select "Music," then press ENTER.

4 Select the desired directory, then press ENTER.

5 Select the desired track, then press ENTER.
The selected track starts playing.
When a track or album is being played, the title is shown in a box.

To stop play
Press ■ STOP.

To play repeatedly
Press REPEAT repeatedly during playback.
Off: does not play repeatedly.
File: repeats the current track.
Folder: repeats the current album.

To return to the previous display
Press ↩ RETURN.

To return to the display for selecting a media type
Press ■ STOP, then press TOP MENU.

About MP3 audio tracks

MP3 is audio compression technology that satisfies certain ISO/MPEG regulations.
You can play back DATA CDs (CD-Rs/CD-RWs) recorded in MP3 (MPEG1 Audio Layer 3) format. However, the discs must be recorded according to ISO9660 Level 1, Level 2 or Joliet format for the recorder to recognize the tracks. You can also play discs recorded in Multi Session.
See the instructions supplied with the CD-R/CD-RW drives and the recording software (not supplied) for details on the recording format.

Note on Multi Session discs
If MP3 audio tracks are recorded in the first session, the recorder will also play MP3 audio tracks in other sessions. If audio tracks in Music CD format are recorded in the first session, only the first session will be played back.

Hints
- Since a disc with many trees takes longer to start playback, it is recommended that you create albums with no more than two trees.
- When playback of all the MP3 audio tracks within the album finishes, the recorder stops.

Notes
- The recorder may not be able to play some DATA CDs created in the Packet Write format.
- The recorder will play any data with the extension ".MP3," even if they are not in MP3 format. Playing this data may generate a loud noise which could damage your speaker system.
- The recorder does not conform to audio tracks in MP3PRO format.
- The recorder can recognize up to 499 MP3 files within a single folder. The recorder may not recognize some discs depending on the recording device used for recording or the disc condition.
- The recorder can play MP3 audio tracks recorded in the following sampling frequencies: 32 kHz, 44.1 kHz, 48 kHz.
- ID3 tags cannot be displayed.
- Only alphabet and numbers can be used for album or track names. Anything else is displayed as an asterisk.

→continued

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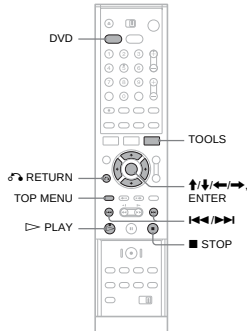
Playing JPEG Image Files

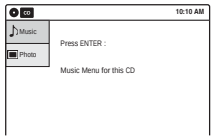
DATA CD

You can play JPEG image files on DATA CDs (CD-Rs/CD-RWs).



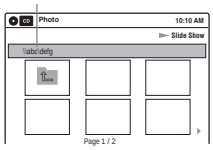
1 Press DVD to control the DVD recorder.

2 Place a DATA CD on the disc tray.
When you load a DATA CD which contains MP3 audio tracks and JPEG image files, the display for selecting a media type appears.



If you load a DATA CD which contains only JPEG files, the screen shown in step 3 appears. Skip to step 4.

3 Select "Photo," then press ENTER.
Directory information



4 Press I◄◄/►►I to select the next/previous album page, then press ↑/↓/←/→ to select an image.

To display the selected image

1 Press ENTER.
The selected image is displayed over the entire screen.

2 To display the next/previous image, press I◄◄/►►I.

To play the Slide show

1 Press ▷ PLAY.
You can also play the Slide show using the menu on the selected image.
For details, see "To enjoy the Slide show" on page 65.

2 Press ←/→ to select the desired playing speed on the "Slide Show Speed" menu, then press ENTER.
Slide show starts from the selected image.

To rotate the selected image

1 Press ↑/↓/←/→ to select an image in the "Index" display, then press ENTER.

2 Press ←/→ to select " ," then press ENTER.
Each time you press ENTER, the image turns clockwise by 90°.

To zoom in an image

1 Press ↑/↓/←/→ to select an image in the "Index" display, then press ENTER.

2 Press ←/→ to select " ," then press ENTER.

3 Press ENTER repeatedly to change the magnification. Each time you press ENTER, the magnification changes as shown below.
2× → 4× → 2× → normal magnification

To enjoy the Slide show

1 Press ↑/↓/←/→ to select an image in the "Index" display, then press ENTER.

2 Press ←/→ to select " ," then press ENTER.
The "Slide Show Speed" menu appears.
" ": Slow
" ": Normal
" ": Fast

3 Press ←/→ to select the desired play speed, then press ENTER.
Slide show starts.

To turn on/off the menu in the single image display
Press TOOLS to turn off the menu.

To return to the previous display
Press ↩ RETURN.

To return to the display for selecting a media type
Press ■ STOP, then press TOP MENU.

Notes
- Slide show can play in only one direction.
- You cannot rotate or zoom in the image during Slide show.
- If you select " " in the rotated image display, the images in the "Index" display will not be rotated.

About JPEG image files

You can play JPEG image files on CD-Rs or CD-RWs. However, the discs must be recorded according to ISO9660 level 1 or level 2 for the player to recognize the files.
You can also play discs recorded in Multi Session. See the instructions of the CD-R/RW device or recording software (not supplied) for details on the recording format.

To play a Multi Session CD
This player can play Multi Session CDs when an JPEG image file is located in the first session. Any subsequent JPEG image files, recorded in the later sessions, can also be played back. When audio tracks and images in music CD format or video CD format are recorded in the first session, only the first session will be played back.

Hint
If you add numbers (01, 02, 03, etc.) to the front of the file names, the files will be played in that order.

Notes
- The system can play the extension ".JPG" or ".JPEG."
- Some CD-Rs or CD-RWs cannot be played on this system depending on file format.
- If you add the extension ".JPG" or ".JPEG" to data not in JPEG format, "Can not Display" will appear.
- Depending on the disc or the size of image files, playback may take some time to start.
- The recorder can recognize up to 999 JPEG files within a single folder. The recorder may not recognize some discs depending on the recording device used for recording or the disc condition.
- Progressive and lossless compression JPEG image files are not supported.
- The image size that can be displayed is limited. You can display the following images;
width 32 – 7,680 pixels by height 32 – 8,192 pixels.

→continued

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Before Recording

Before you start recording…
Check that the tape is longer than the recording time.

Hint
Timer recordings will start regardless of whether or not the recorder is turned on. You cannot turn off the recorder during a timer recording. The recorder automatically turns off after the timer recording finishes.

Note
This recorder shares a single tuner for both the DVD recorder and the VCR. You cannot record different programs to a DVD and a VHS tape at the same time.

Recording a stereo/SAP program

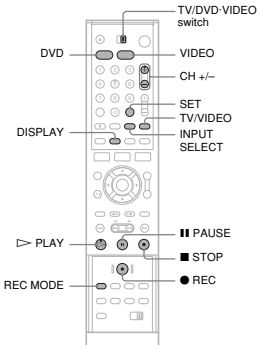
The recorder can receive and record stereo/SAP programs.

Stereo programs
When a stereo program is received, the "STEREO" indicator lights up in the front panel display. If there is noise in the stereo program, press AUDIO repeatedly until the "MONO" indicator disappears from the TV screen. The sound will be recorded in monaural but with less noise.

SAP (Second Audio Program)
When a SAP (Second Audio Program) is received, the "SAP" indicator lights up in the front panel display. To record only SAP sound, set "Tuner Audio" of "Audio" to "SAP" in the "Setup" display (page 102).

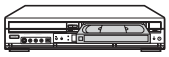
VCR Recording without the Timer

VHS



1 Press VIDEO to control the VCR.

2 Insert a tape with its safety tab in place.



3 Press CH +/– or INPUT SELECT to select the channel or input source you want to record.

4 Press REC MODE repeatedly to select the tape speed, "SP" or "EP."
"EP" (Extended Play) provides recording time three times as long as "SP" (Standard Play). However, "SP" produces better picture and audio quality.

5 Press ● REC.
"REC" appears in the front panel display and recording starts.

To stop recording
Press ■ STOP.

To pause recording
Press ▮▮ PAUSE.
To restart recording, press ▮▮ PAUSE again.
If you pause recording for more than 5 minutes, recording stops automatically.

To watch another TV program while recording

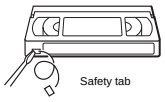
1 Slide the TV/DVD·VIDEO switch to TV.

2 Press TV/VIDEO to switch to the TV's antenna input.

3 Select another channel on the TV.

To watch a DVD while recording
Press DVD to control the DVD recorder, insert a disc, then press ▷ PLAY.

To save a recording
To prevent accidental erasure, break off the safety tab as illustrated. To record on the tape again, cover the tab hole with adhesive tape.



Hints
- To select a channel, you can use the number buttons. Enter the channel number, and press SET.
- You can select a video source from the LINE 1 IN or LINE 2 IN jacks using the INPUT SELECT button.
- The display appears on the TV screen indicating information about the tape, but the information will not be recorded on the tape.
- If you do not want to watch TV while recording, you can turn off the TV. When using a cable box, make sure to leave it on.

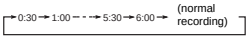
Notes
- You cannot change the channel or input source of the recorder using CH +/– or INPUT SELECT while recording another TV program.
- If you insert a tape with its safety tab removed, the tape is ejected when you press ● REC.

Recording using the Quick Timer (One-touch Timer Recording)

You can set the recorder to record in 30 minute increments.

1 Press VIDEO to control the VCR.

2 Press ● REC repeatedly to set the duration.
Each press advances the time in 30 minute increments. The maximum duration is six hours.



"OTR" (One-touch Timer Recording) and the remaining recording time are displayed in the front panel display while recording.
The time counter decreases minute by minute to 0:00, then the recorder stops recording (power turns off).

To cancel the Quick Timer
Press ● REC repeatedly until the counter appears in the front panel display. The recorder returns to normal recording mode.

To stop recording
Press ■ STOP twice.

Hint
If you do not want to watch TV while recording, you can turn off the TV. When using a cable box or satellite receiver, make sure to leave it on.

Notes
- You cannot change the recording mode while recording.
- You cannot watch a TV program while recording another TV program.

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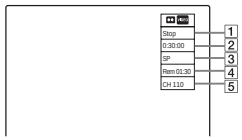
Checking the remaining time

Press DISPLAY.



1 Play mode
2 Time counter
3 Recording mode
4 Remaining time
5 Current channel

To check the remaining time of a tape, set "VCR Function" – "Tape Length" of "Features" in the "Setup" display correctly (page 104).

Maximum recording time

Tape Length	SP	EP
T-120	2 hrs	6 hrs
T-160	2 hrs 40 mins	8 hrs
T-180	3 hrs	9 hrs

Notes
- The remaining tape length may not be indicated accurately for short tapes such as T-20 or T-30, or tapes recorded in LP mode.
- It may take up to one minute for the VCR to calculate and display the remaining tape length after you press DISPLAY.

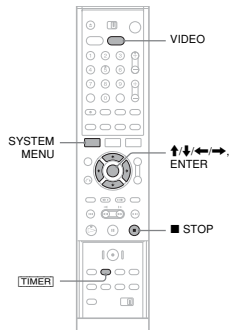
VCR Timer Recording (Standard/VCR Plus+)

VHS

You can set the timer for a total of 12 programs together with DVD Timer Recording and VCR Timer Recording, up to one month in advance. There are two methods to set the timer: the standard method and VCR Plus+ method.
- Standard: Set the date, time, and channel of the program manually.
- VCR Plus+: Enter the PlusCode number designated for each TV program (page 71).

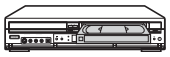
Note
Do not operate your cable box or satellite receiver just before or during a timer recording. This may prevent the accurate recording of a program.

Setting the timer manually (Standard)

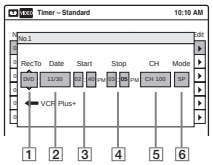


1 Press VIDEO to control the VCR.

2 Insert a tape with its safety tab in place.



3 Press TIMER.



If the Timer programming (VCR Plus+) menu appears, press ← to switch the display to "Standard."

4 Select an item using ←/→ and adjust using ↑/↓.

1 "RecTo":
Select "VCR."

2 "Date":
Sets the date using ↑.
To record the same program every day or the same day every week, press ↓.
The item changes as follows:
Today ↔ Mon-Fri (Monday to Friday) ↔ Sun (every Sunday) ↔ Mon (every Monday) ↔ … ↔ Sat (every Saturday) ↔ 1 month later ↔ … ↔ Today

3 "Start":
Sets the start time.

4 "Stop":
Sets the stop time.

5 "CH":
Selects the channel or input source.

6 "Mode":
Selects the recording mode; "SP" or "EP." To use the Auto Tape Speed function, select "Auto." For details, see "To use the Auto Tape Speed function" on page 71.

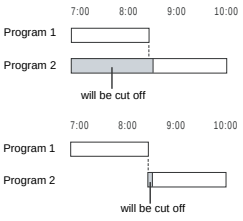
If you make a mistake, select the item and change the setting.

5 Press ENTER.
The Timer List menu (page 74) appears. The ◴ indicator lights up in the front panel display, and the recorder is ready to start recording. If the ◴ indicator flashes in the front panel display, check that a tape with its safety tab in place is inserted.
If the timer settings overlap, a message appears. To confirm, change, or cancel timer recording, see "Checking/Changing/Canceling VCR Timer Settings (Timer List)" on page 74.

6 Press SYSTEM MENU to exit the menu.

To stop recording
Press ■ STOP twice.

If the timer settings overlap
The program that starts first has priority and the second program starts recording only after the first program has finished. If the programs start at the same time, the program listed first in the menu has priority.



To confirm, change, or cancel timer recording
See "Checking/Changing/Canceling VCR Timer Settings (Timer List)" on page 74.

→continued 69 70

To use the Auto Tape Speed function

When you are recording a program in the Auto mode and the remaining tape becomes shorter than the recording time, the tape speed is automatically changed to EP mode. Note that some noise will appear on the picture when the tape speed is changed. If you want to keep the tape speed, select "SP." To operate this function, set "VCR Function" – "Tape Length" of "Features" in the "Setup" display correctly (page 104).

Hints

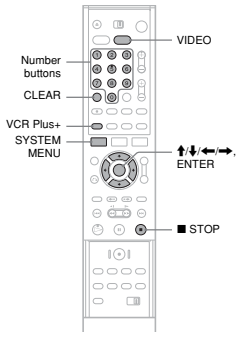
- When the start time and the channel or input source to be recorded are the same but the "RecTo" setting differs, the program is recorded to both the DVD disc and the VHS tape.
- You can also display the Timer programming menu as follows:
  1 Press SYSTEM MENU.
  The System Menu appears.
  2 Select "Timer," and press ENTER.
  3 Select "Timer – Standard," and press ENTER.

Notes

- To record a cable or satellite program, turn on the cable box or satellite receiver and select the program you want to record. Leave the cable box or satellite receiver turned on until the recorder finishes recording.
- Even if the timer is set, timer recordings cannot be made while recording a program that has priority.
- You cannot record on a tape with its safety tab removed.
- Before the timer recording starts, "TIMER REC" flashes in the front panel display.

Recording TV programs using the VCR Plus+ system

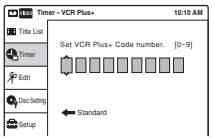
The VCR Plus+ system is a feature that simplifies setting the timer. Just enter the PlusCode number listed in the TV program guide. The date, time, and channel of that program are set automatically. Before you start, check that the TV and guide channels are correctly set in "Guide Channel Setup" of "Tuner Preset" in the "Setup" display (page 98).



1 Press VIDEO to control the VCR.

2 Insert a tape with its safety tab in place.

3 Press VCR Plus+.



If the Timer programming (Standard) menu appears, press ← to switch the display to "VCR Plus+."

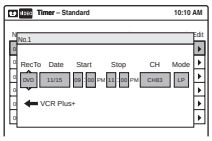
→continued

4 Press the number buttons to enter the PlusCode number.

If you make a mistake, press CLEAR and re-enter the correct number.

5 Press ENTER.

The date, start and stop times, channel, and recording mode appear.
The ◴ indicator lights up in the front panel display, and the recorder is ready to start recording. If the ◴ indicator flashes in the front panel display, check that a tape with its safety tab in place is inserted.



6 Select "RecTo" using ←/→ and select "VCR" using ↑/↓, and press ENTER.

If you want to change other settings, press ←/→ to select the item and press ↑/↓ to change the setting.

7 Press SYSTEM MENU to exit the menu.

To stop recording

Press ■ STOP twice.

If the timer settings overlap

See page 70.

To confirm, change, or cancel timer recording

See "Checking/Changing/Canceling VCR Timer Settings (Timer List)" on page 74.

Hint

You can also display the Timer programming menu as follows:
1 Press SYSTEM MENU.
The System Menu appears.
2 Select "Timer," and press ENTER.
3 Select "Timer – VCR Plus+," and press ENTER.

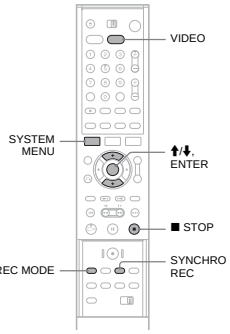
Notes

- When the PlusCode number is incorrect, "Invalid code" appears on the TV screen.
- Before the timer recording starts, "TIMER REC" flashes in the front panel display.
- You cannot record on a tape with its safety tab removed.

Recording from Connected Equipment with a Timer (Synchro Rec)

VHS

You can set the recorder to automatically record programs from connected equipment that has a timer function (such as a satellite tuner). Connect the equipment to the LINE 1 IN jacks of the recorder (page 35).
When the connected equipment turns on, the recorder starts recording a program from the LINE 1 IN jacks.



1 Press VIDEO to control the VCR.

2 Insert a tape with its safety tab in place.

3 Press REC MODE repeatedly to select the tape speed, "SP" or "EP."

"EP" (Extended Play) provides recording time three times as long as "SP" (Standard Play). However, "SP" produces better picture and audio quality.

4 Press SYSTEM MENU while the recorder is in stop mode.

5 Select "Setup," and press ENTER.

6 Select "Features," and press ENTER.

The "Features" setup appears.

7 Select "Synchro Recording," and press ENTER.

8 Select "to Video," and press ENTER.

9 Press SYSTEM MENU to exit the menu.

10 Set the timer on the connected equipment to the time of the program you want to record, and turn it off.

11 Press SYNCHRO REC.

The SYNCHRO REC indicator lights up on the front panel. The recorder is ready to start Synchro-Recording.
The recorder automatically starts recording when it receives an input signal from the connected equipment. The recorder stops recording when the connected equipment turns off.

To stop recording

Press ■ STOP twice.

To cancel Synchro Rec function

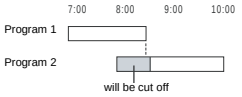
Press SYNCHRO REC. The SYNCHRO REC indicator on the recorder turns off.
If you press SYNCHRO REC during Synchro-Recording, the Synchro-Recording stops, the SYNCHRO REC indicator turns off and the recorder's power turns off.

Notes

- The recorder starts recording only after detecting the video signal from the connected equipment. The beginning of the program may not be recorded regardless of whether or not the recorder's power is on or off.
- During Synchro-Recording, other operations such as normal recording cannot be done.
- To use the connected equipment while the recorder is standing by for Synchro-Recording, cancel Synchro-Recording by pressing SYNCHRO REC. Be sure to turn off the connected equipment and press SYNCHRO REC to reset Synchro-Recording before the timer recording starts.
- The Synchro Rec function does not work with some tuners. For details, see the tuner's operating instructions.
- While the recorder is standing by for Synchro-Recording, the Auto Clock Set function (page 99) does not work.
- To use the Synchro Rec function, you must first set the recorder's clock correctly.
- When the recorder's power is on, the recorder enters the Synchro-Recording standby mode after a Synchro-Recording has finished.
- You cannot record on a tape with its safety tab removed.

If the timer settings of a Synchro-Recording and another timer recording overlap

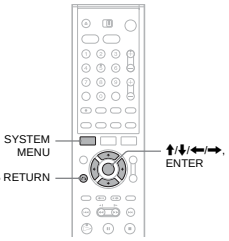
Regardless of whether or not the program is a Synchro Rec program, the program that starts first has priority and the second program starts recording only after the first program has finished.



Checking/Changing/Canceling VCR Timer Settings (Timer List)

VHS

You can check, change, or cancel timer settings using the Timer List menu.

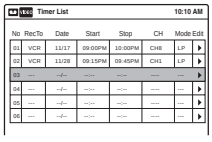


1 Press SYSTEM MENU.

The System Menu appears.

2 Select "Timer," and press ENTER.

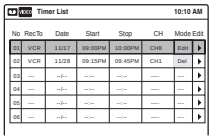
3 Select "Timer List," and press ENTER.



Timer information displays the recording date, time, recording mode, etc.

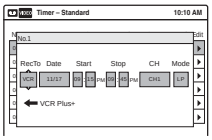
4 Select the timer setting you want to check/change/cancel, and press ENTER.

The sub-menu appears.

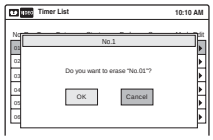

Timer List
10:10 AM
No RecTo Date Start Stop CH Mode Edit
01 VCR 11/17 09:00PM 10:00PM CH8 Edit
02 VCR 11/28 09:15PM 09:45PM CH1 Del

5 Select one of the options, and press ENTER.

"Edit": Changes the timer setting. Select an item using ←/→ and adjust using ↑/↓. Press ENTER.



"Del": Erases the timer setting. Press ENTER.



To turn off the Timer List

Press RETURN.

Hint

While recording, you cannot modify the timer setting for the current recording.

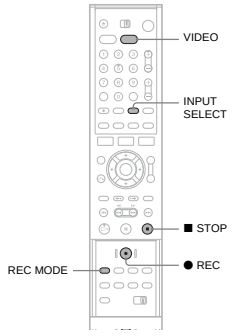
Note

Even if the timer is set, timer recordings cannot be made while recording a program that has priority.

Recording from Connected Equipment without a Timer

VHS

You can record from a connected VCR or similar device. To connect other VCR or similar device, see "Connecting Another VCR or Similar Device" on page 34.

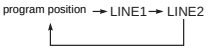


1 Press VIDEO to control the VCR.

2 Insert a tape with its safety tab in place.

3 Press INPUT SELECT to select an input source according to the connection you made.

The front panel display changes as follows:



4 Press REC MODE repeatedly to select the tape speed, "SP" or "EP."

"EP" (Extended Play) provides recording time three times as long as "SP" (Standard Play). However, "SP" produces better picture and audio quality.

5 Insert the source tape into the connected equipment and set to playback pause.

6 At the same time, press ● REC on this recorder and the pause or play button on the connected equipment.

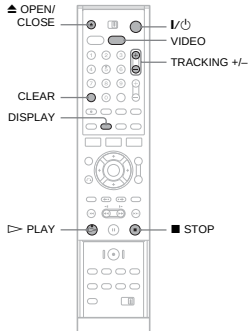
Recording starts.
To stop recording, press ■ STOP on this recorder.

Notes

- When recording a video game image, the screen may not be clear.
- You cannot record on a tape with its safety tab removed.

Playing

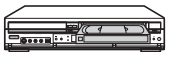
VHS



1 Press VIDEO to control the VCR.

2 Insert a tape.

The VCR starts playing automatically if you insert a tape with its safety tab removed.



3 Press ▷ PLAY.

The display window shows the playback time. When the tape reaches the end, it will rewind automatically.

To stop playback

Press ■ STOP.

To eject the tape

Press ⏏ OPEN/CLOSE.

To turn off the power while rewinding (Rewind Shut Off)

Press I/⏻ while the tape is rewinding. The power will turn off but the tape will keep rewinding until it reaches the end.

To use the time counter

Press CLEAR at the point on the tape that you want to find later. The counter in the front panel display resets to "0:00:00." To search for the counter 0:00:00 point automatically, see "Searching for the counter 0:00:00 point" on page 79.
To display the counter on the TV screen, press DISPLAY.

Notes

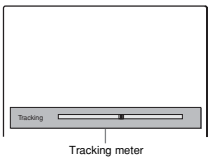
- Tapes recorded in LP mode on other VCRs can be played back on this VCR but the picture quality cannot be guaranteed.
- The counter resets to "0:00:00" whenever a tape is reinserted.
- The counter stops counting when it comes to a portion with no recording.
- When 10 hours have passed, the counter in the front panel display returns to "0:00:00" and the count starts over again.
- When playback does not start even if you insert a tape with its safety tab removed, set "VCR Function" – "Auto Play" of "Features" to "On" in the "Setup" display (page 104).
- Stop disc playback while playing back a video.
- The VCR can also play S-VHS tapes. The VCR will automatically identify the type of tape inserted in the VCR (either VHS or S-VHS). When S-VHS tapes are played in the VCR, the enhanced resolution will not be visible on screen; there may also be picture distortion while playing the S-VHS tape in slow motion or while utilizing other special playback modes. The VCR will not record in S-VHS mode on an S-VHS tape.
- For details on the operation restrictions, see page 8.

Adjusting the picture (tracking)

Although the VCR automatically adjusts the tracking when playing a tape, distortion may occur if the recording is in poor condition. In this case, manually adjust the tracking.

Press TRACKING +/– to adjust the picture.

The tracking meter appears.
Press TRACKING +/– repeatedly until the distortion disappears.

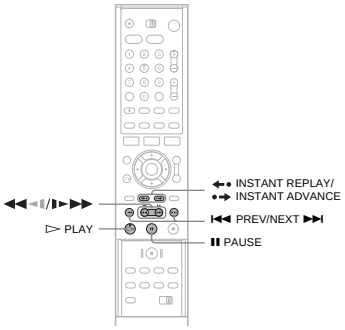


Tracking meter

To resume automatic tracking adjustment

Press TRACKING + and TRACKING – at the same time.
Or, eject the tape and reinsert it.

Playback option



Buttons	Operations
◀◀◀Ⅱ/Ⅱ▶▶▶ (fast reverse/fast forward)	• Fast reverses/fast forwards when pressed during stop. When you press and hold down the button during fast reverse/fast forward, you can view the picture. • Plays at high speed when briefly pressed during playback. When you press and hold down the button during playback, playing at high speed continues until you release the button.
◀◀◀Ⅱ/Ⅱ▶▶▶ (slow)	Plays in slow motion when pressed in pause mode.
•▶ INSTANT ADVANCE	• Plays frame by frame when pressed in pause mode. • Fast forwards the current scene for 30 seconds when pressed during playback. *1
◀• INSTANT REPLAY	Replays the previous scene when pressed during playback. *2
I◀◀ PREV/ NEXT ▶▶I	Fast reverses/fast forwards when pressed during playback. Search speed changes as follows: –×7 ↔ –×5 ↔ –×3 ↔ STILL ↔ SLOW ↔ PLAY ↔ ×2 ↔ ×3 ↔ ×5 ↔ ×7
❚❚ PAUSE	Pauses playback. If you pause playback for more than 5 minutes, playback starts automatically.

*1 You can press •▶ INSTANT ADVANCE up to 4 time. This allows you to fast forward up to 2 minutes in total.
*2 For 10 seconds in SP or LP mode/for 15 seconds in EP mode

To resume normal playback, press ▷ PLAY.

Notes

- The sound is muted during playback at various speeds.
- The picture may show noise when playing at high speed in reverse.

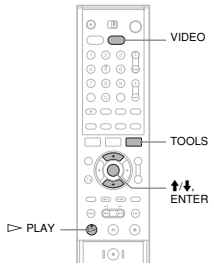
➡continued

Searching Using Various Functions

The VCR automatically marks the tape with an index signal at the point where each recording begins.
You can easily find a specific point using various search functions.

Note

You cannot use these search functions during DVD recording.

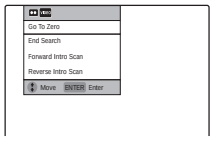


Searching for the counter 0:00:00 point

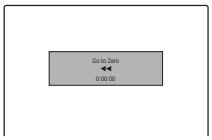
To mark a point on the tape that you want to find later, reset the tape counter to "0:00:00."
The VCR automatically fast-forwards or rewinds to the 0:00:00 point on the tape counter.

1 **Press VIDEO to control the VCR.**

2 **Press TOOLS.**
The TOOLS menu appears.



3 **Select "Go To Zero," and press ENTER.**
The VCR starts searching and automatically stops at the 0:00:00 point.

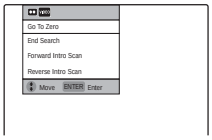


Searching for a blank space of the tape

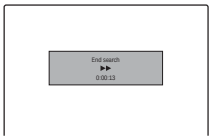
The VCR automatically searches for the beginning of a blank space. You can easily find a point you can start recording from.

1 **Press VIDEO to control the VCR.**

2 **Press TOOLS.**
The TOOLS menu appears.



3 **Select "End Search," and press ENTER.**
The VCR starts searching and automatically stops at the beginning of a blank space. If no blank space is found, the VCR reaches the end.



Note

The VCR may be unable to recognize the end of a blank space depending on the length of that blank space.

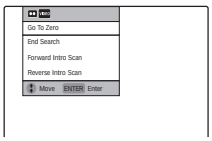
→continued

Searching using the index function (Scan and Play)

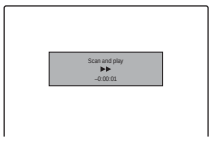
The VCR automatically marks the tape with an index signal at the point where each recording begins. Use these signals as references to find a specific recording.

1 **Press VIDEO to control the VCR.**

2 **Press TOOLS.**
The TOOLS menu appears.



3 **Select "Forward Intro Scan" to scan ahead, or "Reverse Intro Scan" to scan backwards.**
The VCR searches and then plays back for about five seconds.

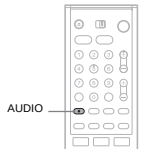


4 **Press PLAY to view that program.**
If you do not press PLAY, the VCR automatically searches for the next index mark, or until it reaches the end of the tape.

Note

Once in recording mode, if the VCR is put in pause and then released to start the recording, no index mark will be inserted. An index mark will be inserted if the channel is changed while VCR is put in pause.

Selecting the sound during playback

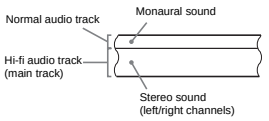


Press AUDIO repeatedly during playback.

To listen to	On-screen display	Front panel display
Stereo	Hi-Fi	STEREO
Left channel	Left	STEREO
Right channel	Right	STEREO
Monaural sound on the normal audio track	Mono	No indicator

How sound is recorded on a video tape

The VCR records sound onto two separate tracks. Hi-fi audio is recorded onto the main track along with the picture. Monaural sound is recorded onto the normal audio track along the edge of the tape.



Notes

- To play a tape in stereo, you must use the A/V connections.
- When you play a tape recorded in monaural, the sound is heard in monaural regardless of the AUDIO setting.

DVD Editing

Before Editing

This recorder offers various edit options for various disc types. Before you edit, check the disc type in the front panel display, and select the option available for your disc (page 10).

Note

You may lose the edited contents if you remove the disc or a timer recording starts while editing.

Edit options for DVD+RWs/DVD-RWs (Video mode)/DVD+Rs/DVD-Rs

+RW -RWVideo +R -R

You can perform simple edits. Since Video mode titles are actual recordings on the disc, you cannot undo any edits you make. The edit functions available for Video mode titles are:
– Setting protection against erasure (page 82).
– Labeling a title (page 82).
– Erasing a title (page 82).

Notes

- Once the disc is finalized, you cannot edit or record on the disc (except for DVD+RWs).
- If a message appears and indicates that the disc's control information is full, erase unnecessary titles.

Edit options for DVD-RWs (VR mode)

-RWVR

You can enjoy advanced edit functions. First you have two options for a DVD-RW (VR mode): editing either the original recording (called the "original"), or the playback information created from the original (called a "Playlist"). Since each is different in nature and offers different merits, read the following and select the one that better suits your needs.

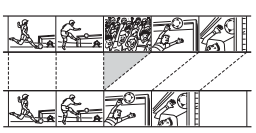
To edit original titles

Edits made to the original titles are final. If you plan to retain an unaltered original recording, create and edit a Playlist (see below). The edit functions available for original titles are:
– Labeling a title (page 82).
– Setting protection against erasure (page 82).
– Erasing a title (page 82).
– Erasing a section of a title (A-B Erase) (page 83).

To create and edit Playlist titles

A Playlist is a group of Playlist titles created from the original title for editing purposes. When you create a Playlist, only the control information necessary for playback, such as the playback order, is stored on the disc. Since the original titles are left unaltered, Playlist titles can be re-edited.

Example: You have recorded the final few matches of a soccer tournament on a DVD-RW (VR mode). You want to create a digest with the goal scenes and other highlights, but you also want to keep the original recording.



In this case, you can compile highlight scenes as a Playlist title. You can even rearrange the scene order within the Playlist title ("Creating a Playlist" on page 84).

→continued

The advanced edit functions available for Playlist titles are:
– Labeling a title (page 82).
– Erasing a title (page 82).
– Editing a Playlist scene (page 86).

Hint

You can display the disc's Playlist titles in the Title List (Playlist), or the original titles in the Title List (Original). To switch the two Title Lists, press TITLE LIST, and press ORIGINAL/PLAYLIST.

Notes

- You cannot protect Playlist titles.
- If a message appears and indicates that the disc's control information is full, erase unnecessary titles.

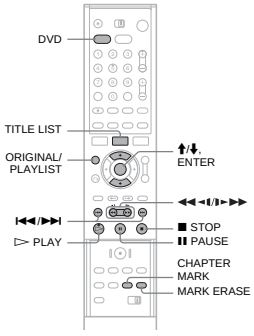
Editing a Title

+RW -RWVR -RWVideo +R -R

This section explains the basic edit functions. Note that editing is irreversible. To edit a DVD-RW (VR mode) without changing the original recordings, create a Playlist title (page 84).

Note

When editing a DVD+R, DVD-R, or DVD-RW (Video mode), finish all editing before finalizing the disc. You cannot edit a finalized disc.



1 **Press DVD to control the DVD recorder.**

2 **Press TITLE LIST.**
When editing a DVD-RW in VR mode, press ORIGINAL/PLAYLIST to switch the "Title List(Original)," if necessary.

3 **Select a title, and press ENTER.**
The sub-menu appears.

4 Select an option, and press ENTER.
You can make the following edits to the title.
“Erase”: Erases the selected title. Select “OK” when asked for confirmation.
“Protect”: Protects the title. Select “On” when the Protection display appears. “🔒” appears next to the protected title. To cancel the protection, select “Off.”
“Title Name”: Allows you to enter or re-enter a title name (page 46).
“A-B Erase”: Erases a section of the title (see below).

Hint
You can label or re-label DVDs (page 43).

Note
You cannot protect Playlist titles.

Erasing a section of a title (A-B Erase)

-RWVR

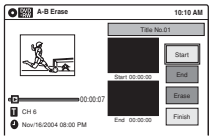
You can select a section (scene) in a title and erase it. Note that erasing scenes in a title cannot be undone.

1 Press DVD to control the DVD recorder.

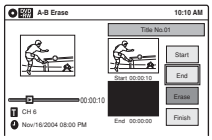
2 Press TITLE LIST.
Press ORIGINAL/PLAYLIST to switch the “Title List(Original),” if necessary.

3 Select a title, and press ENTER.
The sub-menu appears.

4 Select “A-B Erase,” and press ENTER.
The display for setting points A and B appears.
“Start” is selected.



5 Press ENTER at the starting point of the portion to be erased (point A).
You can use ▷ PLAY, ◀◀◀/▮/▮▶▶▶, ⏮/⏭, ■ STOP and ❚❚ PAUSE to find the point of the portion to be erased.
“End” is selected.



6 Press ENTER at the ending point of the portion to be erased (point B).
“Erase” is selected.

7 Select “Erase,” and press ENTER.
The display asks for confirmation.

8 Select “OK,” and press ENTER.
The scene is erased. To continue, repeat from step 5. To finish, select “Finish.”

Hint
A chapter mark is inserted after the scene was erased. The chapter mark divides the title into separate chapters on either side of the mark.

Notes
- Images or sound may be momentarily interrupted at the point where you erase a section of a title.
- Sections shorter than five seconds may not be erased.
- The start and end points of a title may be different from what you have set.
- The total playing time of the title does not change even if a scene was erased.

DVD Editing

➡continued

Creating chapters manually

+RW -RWVR

You can manually insert a chapter mark at any point you like during playback.

Press CHAPTER MARK at the point where you want to divide the title into chapters.
Each time you press the button, “Marking mark...” appears on the screen and the scenes before and after of the mark become separate chapters.

To erase chapter marks
You can combine two chapters by erasing the chapter mark during playback.
During playback, press MARK ERASE.
The current chapter combines with the previous chapter.

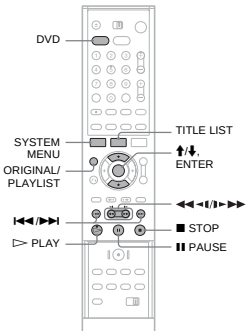
Note
If a message appears and indicates that no more chapter marks can be added, you may not be able to record or edit.

Creating a Playlist

-RWVR

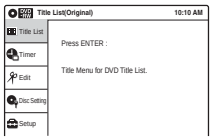
You can add a section of the title to the Playlist title as one scene without changing the actual recordings. A Playlist title can contain up to 99 scenes.
For details, see “Edit options for DVD-RWs (VR mode)” on page 81.

Note
If you erase an original title used in a Playlist, that Playlist is also erased.

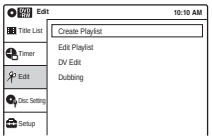


1 Press DVD to control the DVD recorder.

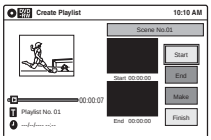
2 Press SYSTEM MENU while the recorder is stopped.



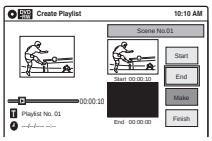
3 Select “Edit,” and press ENTER.



4 Select “Create Playlist,” and press ENTER.
“Start” is selected.



5 Press ENTER at the starting point.
You can use ▷ PLAY, ◀◀◀/▮/▮▶▶▶, ⏮/⏭, ■ STOP and ❚❚ PAUSE to find the point.
“End” is selected.



6 Press ENTER at the ending point.
“Make” is selected.
To reset the start or end point, select “Start” or “End” and repeat step 5 or 6.

7 Press ENTER.
The selected section is captured as a scene. To continue, repeat the steps above.

8 When you finish capturing scenes, select “Finish” and press ENTER.

To play the Playlist title

1 Press TITLE LIST.

2 Press ORIGINAL/PLAYLIST to switch to the “Playlist.”

3 Select a Playlist title, and press ENTER.
The sub-menu appears.

4 Select “Play,” and press ENTER.

Hint
When a Playlist title is created, the start and end points will become chapter marks, and each scene will become a chapter.

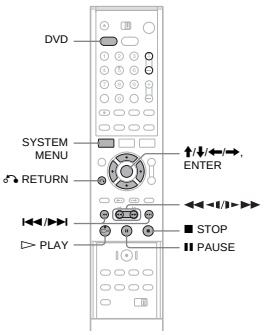
Notes
- The picture may pause when the edited scene is played.
- The start and end points of a title may be different from what you have set.

DVD Editing

Editing a Playlist

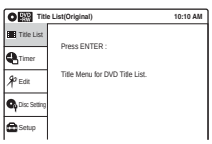
-RWVR

You can edit a scene of the Playlist titles.

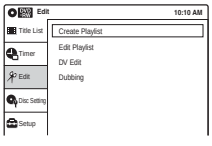


1 Press DVD to control the DVD recorder.

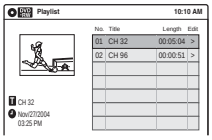
2 Press SYSTEM MENU while the recorder is stopped.



3 Select “Edit,” and press ENTER.



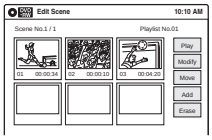
4 Select “Edit Playlist,” and press ENTER.
The display for selecting Playlist titles appears.



5 Select a Playlist title, and press ENTER.
The sub-menu appears.

6 Select an option, and press ENTER.
You can make the following edits to the title.
“Erase”: Erases the selected Playlist title. Select “OK” when asked for confirmation.
“Title Name”: Allows you to enter or re-enter a Playlist title name (page 46).
“Edit Scene”: Allows you to re-edit without changing the actual recordings (see below).
“Title List”: Switches to the “Title List(Original).”

7 Select “Edit Scene,” and press ENTER.



The Scene List menu appears with all of the selected scenes.
“Modify”: Allows you to change the start and end point of the selected scene. See “Modifying a scene (Modify)” on page 87.
“Move”: Changes the scene order. See “Moving a scene (Move)” on page 87.
“Add”: Allows you to add more scenes before the selected scene. See “Adding a scene (Add)” on page 88.
“Erase”: Erases the scene. The selection is canceled. See “Erasing a scene (Erase)” on page 88.

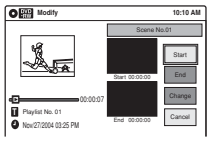
Modifying a scene (Modify)

-RWVR

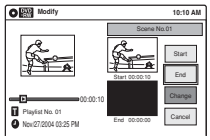
You can change the start and end point of the selected scene.

1 After step 7 of "Editing a Playlist" on page 86, select a scene, and press ENTER.

2 Select "Modify," and press ENTER.
"Start" is selected.



3 Press ENTER at the starting point.
You can use ▷ PLAY, ◀◀◀/▶▶▶, I◀◀/▶▶I, ■ STOP and ❚❚ PAUSE to find the point.
"End" is selected.



4 Press ENTER at the ending point.
"Change" is selected.
To reset the start or end point, select "Start" or "End" and repeat step 3 or 4.

5 Press ENTER.
The display returns to "Edit Scene" display.
The re-selected section is captured as a scene.
To modify other scenes, press ↶ RETURN, and repeat from step 1.

To cancel modifying
Select "Cancel," and press ENTER.

To turn off the display
Press SYSTEM MENU.

Note
The start and end point of a scene may be different from what you have set.

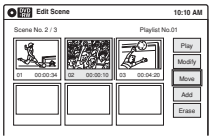
Moving a scene (Move)

-RWVR

You can change the scene order within the Playlist title.

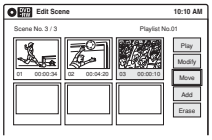
1 After step 7 of "Editing a Playlist" on page 86, select a scene, and press ENTER.

2 Select "Move," and press ENTER.



3 Select a new location using ⬅/➡.

4 Press ENTER.
The selected scene moves to the new location.
To move other scenes press ↶ RETURN, and repeat from step 1.



To turn off the display
Press SYSTEM MENU.

DVD Editing

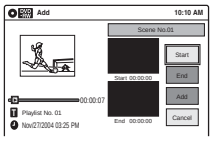
Adding a scene (Add)

-RWVR

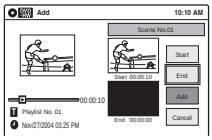
You can add a scene before the selected scene.

1 After step 7 of "Editing a Playlist" on page 86, select a scene, and press ENTER.

2 Select "Add," and press ENTER.
"Start" is selected.



3 Press ENTER at the starting point.
You can use ▷ PLAY, ◀◀◀/▶▶▶, I◀◀/▶▶I, ■ STOP and ❚❚ PAUSE to find the point.
"End" is selected.



4 Press ENTER at the ending point.
"Add" is selected.
To reset the start or end point, select "Start" or "End" and repeat step 3 or 4.

5 Press ENTER.
The display returns to "Edit Scene" display.
The selected section is captured as a scene and added before the selected scene.
To add other scenes, press ↶ RETURN, and repeat from step 1.

To cancel adding
Select "Cancel," and press ENTER.

To turn off the display
Press SYSTEM MENU.

Note
The start and end point of a scene may be different from what you have set.

Erasing a scene (Erase)

-RWVR

You can erase a selected scene.

1 After step 7 of "Editing a Playlist" on page 86, select a scene, and press ENTER.

2 Select "Erase," and press ENTER.
The display asks for confirmation.

3 Select "OK," and press ENTER.
The selected scene is erased.
To erase other scenes, press ↶ RETURN, and repeat from step 1.

To turn off the display
Press SYSTEM MENU.

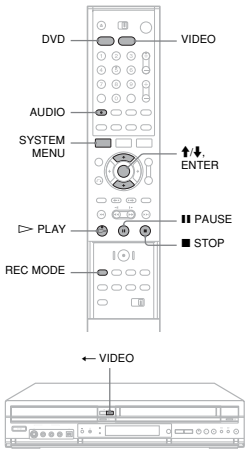
→continued

Dubbing (TAPE ↔ DVD)

Dubbing from a Video to a DVD

+RW -RWVR -RWVideo +R -R VHS

You can record (dub) VHS tape video and audio to a disc. The audio switching and audio settings must be made for both the VHS tape and the disc.



Using the ← VIDEO button on the recorder

1 Insert a recordable disc.

2 Insert a source tape.

3 Press ← VIDEO on the recorder.
Dubbing starts.

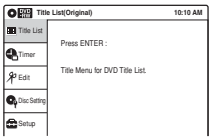
Using the TV screen

1 Insert a recordable disc.

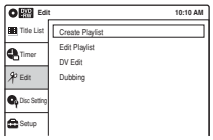
2 Insert a source tape.

3 Press DVD to control the DVD recorder.

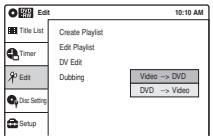
4 Press SYSTEM MENU while the recorder is stopped.



5 Select "Edit," and press ENTER.



6 Select "Dubbing," and press ENTER.



7 Select "Video → DVD," and press ENTER.
The display for confirmation appears.

8 Select "OK," and press ENTER.
Dubbing starts.

To select the recording mode
Press DVD to control the DVD recorder, then press REC MODE repeatedly.
Each time you press the button, the display changes on the TV screen as follows:

HQ → HSP → SP → LP → EP → SLP

For more details about the recording mode, see page 47.

To select the sound

1 After step 2 above, press VIDEO to control the VCR.

2 Press ▷ PLAY.

3 Press AUDIO repeatedly to select the sound you want.
For details, see page 80.

4 Press ❚❚ PAUSE.

5 Follow the instructions above from step 3.

To stop dubbing
Press ■ STOP.
Note that it may take a few seconds for the recorder to stop dubbing.

To play discs recorded with this recorder on other DVD equipment
Finalize the disc. For details, see page 44.

Hints
- A black screen is recorded at the end of the dubbed disc, but this is not a malfunction. When dubbing stops, there may be some time difference between the tape and the disc. In this case, a black (no signal) screen is recorded.
- You can switch the playback tape audio while dubbing.
- When dubbing a VHS tape to a disc, the VHS tape counter value may differ slightly from the DVD recording time.
- The audio output is the VHS playback audio.

Notes
- Dubbing is not possible in the following cases.
  – When a non-recordable DVD is set.
  – When using VHS software with copy guard functions.
- Dubbing stops in the following cases.
  – When the VHS tape is played back to the end and stops.
  – When the VHS deck or the DVD deck is stopped.
  – When the disc remaining time runs out.
- The System menu, TOOLS menu, and information display are not displayed during dubbing.
- Copyrights
  – Recordings made from VHS tapes and other copyrighted material are solely for individual enjoyment, and other unauthorized use is prohibited under copyright law.
  – Unauthorized editing of copyrighted material is prohibited under copyright law.

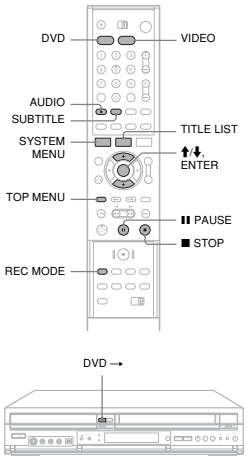
Dubbing (TAPE ↔ DVD)

→continued

Dubbing from a DVD to a Video

+RW -RWVR -RWVideo +R -R DVD VHS

You can record (dub) DVD video and audio to a VHS tape. However, note that when you record copy-protected software to a tape, the video may appear disrupted when you play back the tape.

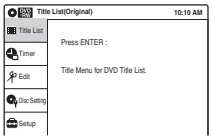


Using the DVD → button on the recorder

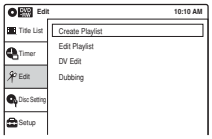
1 **Insert a tape with its safety tab in place.**
2 **Insert a source disc.**
3 **Press DVD to control the DVD recorder.**
4 **Press TOP MENU or TITLE LIST, and select a title.**
5 **Start playing, and press ■ STOP or ❚❚ PAUSE.**
6 **Press DVD → on the recorder.**
Dubbing starts.

Using the TV screen

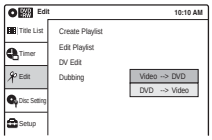
1 **Insert a tape with its safety tab in place.**
2 **Insert a source disc.**
3 **Press DVD to control the DVD recorder.**
4 **Press TOP MENU or TITLE LIST, and select a title.**
5 **Start playing, and press ■ STOP or ❚❚ PAUSE.**
6 **Press SYSTEM MENU.**



7 **Select "Edit," and press ENTER.**



8 **Select "Dubbing," and press ENTER.**



9 **Select "DVD → Video," and press ENTER.**
The display for confirmation appears.
10 **Select "OK," and press ENTER.**
Dubbing starts.
The disc's menu may appear depending on the disc when playback of a disc finishes. In this case, press ■ STOP to stop dubbing, otherwise the disc's menu is recorded until the tape reaches its end.

To select the tape speed

Press VIDEO to control the VCR, then press REC MODE repeatedly to select "SP" or "EP." "EP" (Extended Play) provides recording time three times as long as "SP" (Standard Play). However, "SP" produces better picture and audio quality.

To select the sound or language

After step 5 above, press AUDIO repeatedly to select the sound you want, or press SUBTITLE repeatedly to select the language you want. For details, see page 59.

To stop dubbing

Press ■ STOP.
Note that it may take a few seconds for the recorder to stop dubbing.

Hints

- You can switch the playback DVD audio while dubbing.
- The brightness of the playback video may differ from that during normal DVD playback.
- The DVD playback time may differ slightly from the VHS tape counter value.
- The audio being played back (main audio, sub audio, etc.) is the dubbed audio.

Notes

- Dubbing is not possible when "Video" of "Progressive" is set to "On" in the "Setup" display.
- Dubbing stops in the following cases.
  – When the DVD is played back to the end and stops.
  – When the DVD deck or the VHS deck is stopped.
  – When the tape remaining time runs out.
- The System menu, TOOLS menu, and information display are not displayed during dubbing.
- Copyrights
  – Recordings made from discs and other copyrighted material are solely for individual enjoyment, and other unauthorized use is prohibited under copyright law.
  – Unauthorized editing of copyrighted material is prohibited under copyright law.

→continued

Before DV Dubbing

This section explains dubbing with a digital video camera via the DV IN jack on the front panel. If you want to dub by way of the LINE IN jacks, see "Recording from Connected Equipment with a Timer (Synchro Rec)" on page 53.

To record from the DV IN jack

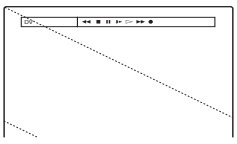
The DV IN jack on this recorder conforms to the i.LINK standard. You can connect any other equipment that has an i.LINK (DV) jack, and record digital signals.
Follow the instructions in "Connecting a Digital Video Camera to the DV IN Jack," and then move on to the section on dubbing. For more information about i.LINK, see "About i.LINK" on page 115.

Hint

If you plan to do additional editing on a disc after the initial dub, use the DV IN jack and record on a DVD-RW (VR mode).

Note

When selecting DV input, lines appear on the screen. This is not a malfunction. Connect a digital video camera and display an image. These lines disappear.

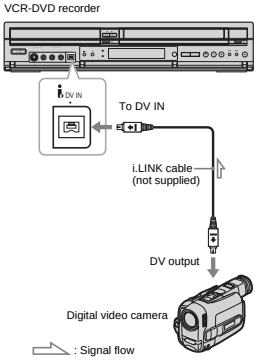


Connecting a Digital Video Camera to the DV IN Jack

You can connect a digital video camera to the DV IN jack on the recorder to record or edit from a DV format tape. Operation is straightforward because the recorder will fast forward and rewind the tape for you – you do not need to operate your digital video camera. Do the following to start using the "DV Edit" functions of this recorder.
See the instruction manual supplied with the digital video camera as well before connecting.

Notes

- The DV IN jack is for input only. It will not output signals.
- You cannot use the DV IN jack when:
  – your digital video camera does not work with this recorder. Connect the camera to the LINE IN jack and follow the instructions of "Recording from Connected Equipment without a Timer" on page 56.
  – the input signal is not in DVC-SD format. Do not connect a MICRO MV format digital video camera even if it has an i.LINK jack.
  – the images on the tape contain copy protection signals, which limit recording.



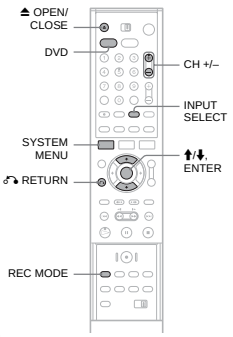
Dubbing from a DV Format Tape to a DVD

+RW -RWVR -RWVideo +R -R

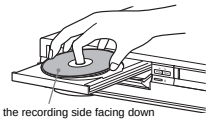
You can record a DV format tape onto a disc. The recorder controls the digital video camera. You can fast forward, rewind, play in slow motion, and stop the tape to select the scenes using the recorder's remote control.

◆How chapters are created

The recorder divides the title in either 5 or 15-minute intervals, according to the setting in "DVD Auto Chapter" in "Features" setup (page 104).



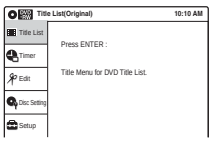
1 **Press DVD to control the DVD recorder.**
2 **Press ⏏ OPEN/CLOSE, and place a recordable disc on the disc tray.**



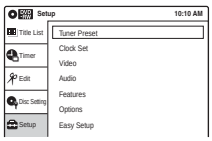
3 **Press ⏏ OPEN/CLOSE to close the disc tray.**
Wait until "LOAD" disappears from the front panel display.
Unused DVD-RWs are formatted in VR mode automatically.
To format in Video mode, see page 43.
4 **Insert the source DV format tape into your digital video camera.**
For the recorder to record or edit, your digital video camera must be set to video playback mode.
5 **Press INPUT SELECT repeatedly to select "DV."**
6 **Press REC MODE repeatedly to select the recording mode.**
Each time you press the button, the display changes on the TV screen as follows:

HQ → HSP → SP → LP → EP → SLP

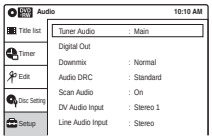
For more details about the recording mode, see page 47.
7 **Press SYSTEM MENU while the recorder is stopped.**



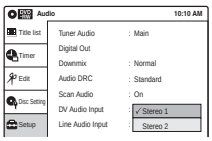
8 **Select "Setup," and press ENTER.**



9 Select “Audio,” and press ENTER.



10 Select “DV Audio Input,” and press ENTER.

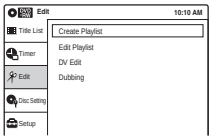


“Stereo 1”: Records original sound only. Normally select this when dubbing a DV format tape.
“Stereo 2”: Records additional audio only. Select “Stereo 2” if you have added a second audio channel when recording with your digital video camera.

11 Select “Stereo 1” or “Stereo 2,” and press ENTER.

12 Press ↶ RETURN twice.

13 Select “Edit,” and press ENTER.



14 Select “DV Edit,” and press ENTER.
The display for recording and “DV Tape Mode” appear.
If “DV Tape Mode” does not appear, check the connection to your digital video camera.

15 Select ● on the TV screen, and press ENTER.
Starts recording the tape contents.
You can use ◀◀, ■, ❚❚, ❚▶, ▷, ▶▶, and ● on the TV screen to search the point you want to start recording.

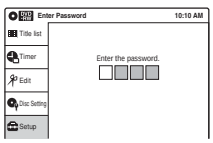
To stop during recording
Select ■ on the TV screen, and press ENTER. Note that it may take a few seconds for the recorder to stop recording.

To turn off the display for recording
Press INPUT SELECT or CH +/–.

Notes

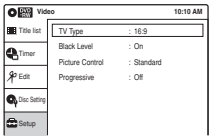
- If you want to play the disc on other DVD equipment, finalize the disc (page 44).
- You cannot connect more than one piece of digital video equipment to the recorder.
- You cannot control the recorder using another device or another recorder of the same model.
- You cannot record date, time, or the contents of the cassette memory onto the disc.
- If you record from a DV format tape with a sound track that is recorded in multiple sampling frequencies (48 kHz, 44.1 kHz, or 32 kHz), no sound or an unnatural sound will be output when playing back the sampling frequency switch point on the disc.
- The recorded picture may be momentarily affected if the picture size of the source image changes, or if there is nothing recorded on the tape.
- Noise may occur when you switch the audio sampling mode (48 kHz/16 bits → 32 kHz/12 bits).

Some items display a dialog box that provides further detailed settings.
Example: The following dialog box appears when “Parental” in “Options” setup is selected.



In this case, see “Parental” in “Language, Parental Control Settings/Factory Settings (Options)” on page 105.

5 Select an option, and press ENTER.
The currently selected option is displayed next to the setup item.
Example: when “16:9” is set.

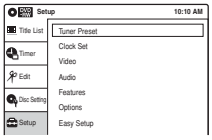


To turn off the display
Press SYSTEM MENU.

Antenna Reception Setting (Tuner Preset)

The “Tuner Preset” setup helps you to make tuner, setting for the recorder.

Select “Tuner Preset” in the “Setup” display. To use the display, see “Using the Setup Displays” on page 96.

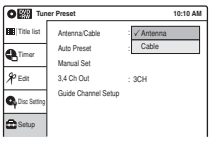


Note
You cannot presets channels for the connected cable box or satellite receiver.

Auto Preset
Automatically presets the receivable channels. The recorder can receive VHF channels 2 to 13, UHF channels 14 to 69, and unscrambled CATV channels 1 to 125. First, we recommend that you preset the receivable channels in your area using automatic presetting methods.

1 Follow steps 1 to 3 of “Using the Setup Displays” on page 96 to select “Tuner Preset” in the “Setup” display.

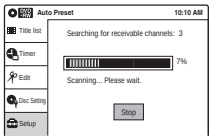
2 Select “Antenna/Cable,” and press ENTER.



“Antenna”: Presets VHF and UHF channels.
“Cable”: Presets cable TV channels.

3 Select an option, and press ENTER.

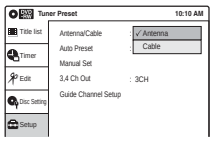
4 Select “Auto Preset,” and press ENTER.
All receivable channels are preset in numerical sequence.



Manual Set
Presets or disables channels manually.
If some channels could not be set using the Auto Preset or Easy Setup function, you can set them manually.

1 Follow steps 1 to 3 of “Using the Setup Displays” on page 96 to select “Tuner Preset” in the “Setup” display.

2 Select “Antenna/Cable,” and press ENTER.

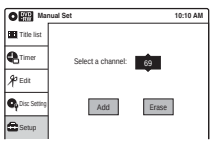


“Antenna”: Presets VHF and UHF channels.
“Cable”: Presets cable TV channels.

3 Select an option, and press ENTER.

4 Select “Manual Set,” and press ENTER.

5 Select the channel you want to preset/disable using ↑/↓ or CH +/–, and press ENTER.



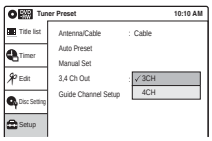
6 Select “Add” or “Erase” using ←/→, and press ENTER.

7 To preset or disable another channel, repeat steps 5 and 6.

3, 4 Ch Out
Set the RF output channel so that the TV can receive the correct signal from the recorder.
For details, see page 19.

1 Follow steps 1 to 3 of “Using the Setup Displays” on page 96 to select “Tuner Preset” in the “Setup” display.

2 Select “3, 4 Ch Out,” and press ENTER.



“3CH”: when using channel 3 to receive the recorder signal.
“4CH”: when using channel 4 to receive the recorder signal.

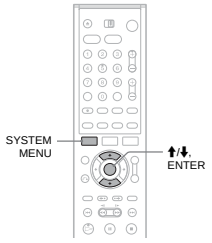
3 Select “3CH” or “4CH,” and press ENTER.
The confirmation messages will be displayed for a while.

Guide Channel Setup
Sets up the guide channel number assigned to each channel.
You need to set this correctly to make timer recordings with the VCR Plus+ function. For details, see page 32.

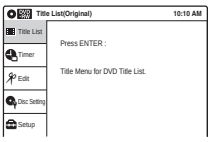
Using the Setup Displays

By using the setup displays, you can make various adjustments to items such as picture and sound, as well as select a language for the subtitles.
The setup displays are used in the following way.

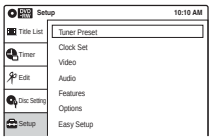
Note
Playback settings stored in the disc take priority over the setup display settings, and not all of the functions described may work.



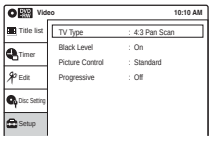
1 Press SYSTEM MENU while the recorder is in stop mode.



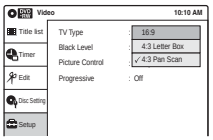
2 Select “Setup,” and press ENTER.
The “Setup” display appears.



3 Select “Tuner Preset,” “Clock Set,” “Video,” “Audio,” “Features,” “Options,” or “Easy Setup,” and press ENTER.
The selected setup display appears.
Example: “Video” setup



4 Select the item you want to set up, and press ENTER.
Available options for the item appear.
Example: “TV Type”



Clock Setting (Clock Set)

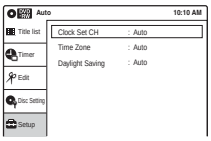
The “Clock Set” setup helps you to make clock setting for the recorder.
Select “Clock Set” in the “Setup” display. To use the display, see “Using the Setup Displays” on page 96.

Auto (Auto Clock Set)

Turns on the Auto Clock Set function when a channel in your local area broadcasts a time signal.

1 Follow steps 1 to 3 of “Using the Setup Displays” on page 96 to select “Clock Set” in the “Setup” display.

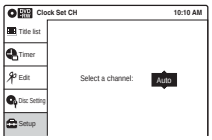
2 Select “Auto,” and press ENTER.



3 Select “Clock Set CH,” “Time Zone,” or “Daylight Saving” and press ENTER.

4 Adjust these settings by pressing ↑/↓ and ENTER.

◆ **Clock Set CH**
Select a channel that carries a time signal using ↑/↓.
Use this option if you know of a channel that carries a time signal. Most PBS member stations broadcast a time signal. For the fastest response select your local PBS station. Leave the setting at “Auto” to have the recorder automatically search for a channel that carries a time signal.



◆ **Time Zone**
Select the time zone for your area, or select “Auto” to have the recorder automatically set your time zone.
The options are:
Auto ⟷ Atlantic ⟷ Eastern ⟷ Central ⟷ Mountain ⟷ Pacific ⟷ Alaska ⟷ Hawaii ⟷ Auto

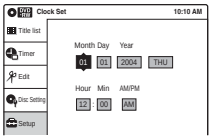
◆ **Daylight Saving**
Select “On” or “Off” (standard time), or select “Auto” to have the recorder automatically set the daylight saving time.

Manual

If the Auto Clock Set function did not set the clock correctly for your local area, set the clock manually.

1 Follow steps 1 to 3 of “Using the Setup Displays” on page 96 to select “Clock Set” in the “Setup” display.

2 Select “Manual,” and press ENTER.



3 Press ↑/↓ to set the month, and press ➡. Set the day, year, hour, minutes, and AM/PM in sequence. Press ⬅/➡ to select the item to be set, then press ↑/↓ to set the numbers. The day of the week is set automatically.

4 Press ENTER to start the clock.

Hint
To change the numbers in step 3, press ⬅ to return to the item to be changed, and select the numbers by pressing ↑/↓.

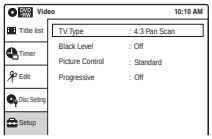
Video Settings (Video)

Video settings will adjust items related to the image, such as size and color.
Choose the settings according to the type of TV, tuner, or decoder connected to the recorder.

1 Press SYSTEM MENU while the recorder is in stop mode.

2 Select “Setup,” and press ENTER.

3 Select “Video,” and press ENTER.
The “Video” setup appears with the following options. The default settings are underlined.



TV Type

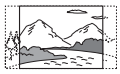
Selects the aspect ratio of the connected TV (4:3 standard or wide).

16:9	Select this when connecting to a wide-screen TV or TV with a wide mode function.
4:3 Letter Box	Select this when connecting to a 4:3 screen TV. Displays a wide picture with bands on the upper and lower portions of the screen.
4:3 Pan Scan	Select this when connecting to a 4:3 screen TV. Automatically displays a wide picture on the entire screen and cuts off the portions that do not fit.

16:9

4:3 Letter Box

4:3 Pan Scan



Note
Depending on the disc, “4:3 Letter Box” may be selected automatically instead of “4:3 Pan Scan” or vice versa.

Black Level

Selects the black level (setup level) for the video signals output from the LINE OUT jacks (page 18).
This setting is not effective when the PROGRESSIVE indicator lights up in the front panel and the recorder outputs progressive signals.

On	Raises the standard black level. Select this when the picture appears too dark.
Off	Sets the black level of the output signal to the standard level. Normally, select this.

Picture control

You can adjust the video signal of the DVD or VIDEO CD (with PBC function off) from the player to obtain the picture quality you want. Select the setting that best suits the program you are watching.

Dynamic 1	Produces a bold dynamic picture by increasing the picture contrast and the color intensity.
Dynamic 2	Produces a more dynamic picture than Dynamic 1 by further increasing the picture contrast and the color intensity.
Standard	Off Displays a standard picture.
Cinema 1	White colors become brighter and black colors become richer, and the color contrast is increased.
Cinema 2	Enhances details in dark areas by increasing the black level.
Personal Adjust	Adjusts “Contrast,” “Brightness,” “Color,” and “Hue” using ↑/↓/⬅/➡.

Hint
When you watch a movie, “Cinema 1” or “Cinema 2” is recommended.

Progressive

If your TV accepts progressive (480p) format signals, you will enjoy accurate color reproduction and high quality image.

1 Follow steps 1 to 3 of “Video Settings (Video)” on page 100.

2 Select “Progressive,” and press ENTER.

3 Select “On,” and press ENTER.

4 Follow the instructions appearing on the TV screen.
1 Ensure your TV is (480p) Progressive Scan capable.
2 Connect with Component Video Output jacks (red/green/blue connections). See “If your TV has component video input jacks” on page 21.
3 Select [OK] to test your video signal.
4 If video signal appears OK, video connection is complete.

5 Press ENTER.
The PROGRESSIVE indicator on the recorder lights up.
If picture is distorted, press ↶ RETURN. Check the connection (page 21).

Hint
The “Progressive” setting can be canceled by pressing ❚❚ PAUSE on the recorder continuously for 5 seconds or more, or selecting “Off” in step 3.

Note
If you select progressive signal when you connect the recorder to a TV that cannot accept the signal in progressive format, the image quality will deteriorate. In this case, set “Progressive” to “Off.”

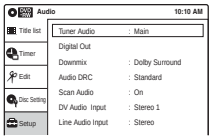
Audio Settings (Audio)

The Audio setup allows you to adjust the sound according to the playback and connection conditions.

1 Press SYSTEM MENU while the recorder is in stop mode.

2 Select “Setup,” and press ENTER.

3 Select “Audio,” and press ENTER.
The “Audio” setup appears with the following options. The default settings are underlined.



Tuner Audio

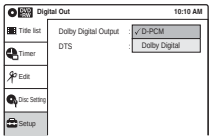
Selects the sound to be recorded.

Main/Sub	Records only the main sound.
SAP	Records only the SAP (Second Audio Program) sound.

Note
If no SAP sound is received, the main sound is recorded regardless of the setting.

Digital Out

The following setup items switch the method of outputting audio signals when you connect a component such as an amplifier (receiver) with a digital input jack.
For connection details, see “Connecting to Your AV/Amplifier (Receiver)” on page 23.
Press ENTER, and select “Dolby Digital” or “DTS.”



If you connect a component that does not accept the selected audio signal, a loud noise (or no sound) will come out from the speakers, and may affect your ears or cause speaker damage.

• Dolby Digital Output (DVDs only)
Selects the type of Dolby Digital signal.

D-PCM	Select this when the recorder is connected to an audio component lacking a built-in Dolby Digital decoder. You can select whether the signals conform to Dolby Surround (Pro Logic) or not by making adjustments to the “Downmix” item in “Audio” setup (page 103).
Dolby Digital	Select this when the recorder is connected to an audio component with a built-in Dolby Digital decoder.

• DTS (DVD VIDEO only)
Selects whether or not to output DTS signals.

On	Select this when the recorder is connected to an audio component with a built-in DTS decoder.
Off	Select this when the recorder is connected to an audio component without a built-in DTS decoder.

Downmix (DVDs only)

Switches the method for mixing down to two channels when you play a DVD which has rear sound elements (channels) or is recorded in Dolby Digital format. For details on the rear signal components, see "Checking the Play Information and Playing Time" on page 45. This function affects the output of the following jacks:
– LINE OUT (AUDIO L/R) jacks
– DIGITAL AUDIO OUT (OPTICAL or COAXIAL) jack when "Dolby Digital Output" is set to "D-PCM" (page 102).

Dolby Surround	Normally select this position. Multi-channel audio signals are output to two channels for enjoying surround sounds.
Normal	Multi-channel audio signals are downmixed to two channels for use with your stereo.

Audio DRC (Dynamic Range Control) (DVDs only)

Makes the sound clear when the volume is turned down when playing a DVD that conforms to "Audio DRC." This affects the output from the following jacks:
– LINE OUT (AUDIO L/R) jacks
– DIGITAL AUDIO OUT (OPTICAL or COAXIAL) jack only when "Dolby Digital Output" is set to "D-PCM" (page 102).

Standard	Normally select this position.
TV Mode	Makes low sounds clear even if you turn the volume down.

Scan Audio

On	Outputs audio signal during FF1 fast-forward of a DVD disc with Dolby Digital sound tracks.
Off	No sound is output during FF1 fast-forward.

DV Audio Input

Stereo 1	Records original sound only. Normally select this when dubbing a DV format tape.
Stereo 2	Records additional audio only.

Note

Select "Stereo 2" if you have added a second audio channel when recording with your digital video camera.

Line Audio Input

When recording from equipment connected to the LINE 1 IN or LINE 2 IN jack to a DVD disc in this recorder, select line input audio.

Stereo	Records stereo sound only. Select this for discs other than DVD-RWs (VR mode).
Main/Sub	Records the two different sound tracks on DVD-RWs (VR mode). You can select either sound track when playing back the disc.

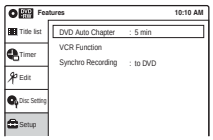
Recording and VCR Settings (Features)

The "Features" setup allows you to change the tape length, auto play and auto repeat settings.

1 Press SYSTEM MENU while the recorder is in stop mode.

2 Select "Setup," and press ENTER.

3 Select "Features," and press ENTER.
The "Features" setup appears with the following options. The default settings are underlined.



DVD Auto Chapter

Automatically divides a recording (a title) into chapters by inserting chapter markings at a specified interval. The markings are inserted while the recording is being made.

Off	No chapter mark is inserted.
5 Min	Inserts chapter marks at approximately 5 minute intervals.
15 Min	Inserts chapter marks at approximately 15 minute intervals.

Note

Depending upon the size of the recording being made, the actual interval may vary from the interval selected in "DVD Auto Chapter." The selected interval should only be used as an approximation to create chapters.

VCR Function

Press ENTER, and select "Tape Length," "Auto Play," and "Auto Repeat."

◆ **Tape Length**

T-120	When using a T-120 or shorter length tape.
T-160	When using a T-160 length tape.
T-180	When using a T-180 or longer length tape.

◆ **Auto Play**

On	To start playback automatically, when you insert a tape with its safety tab removed.
Off	To turn off Auto play. You need to press ▷ PLAY to start playback, even if you insert a tape with its safety tab removed.

◆ **Auto Repeat**

On	To play back a tape repeatedly. The VCR rewinds a tape to the beginning and restarts playback automatically.
Off	To turn off Auto repeat.

Synchro Recording

to DVD	Sets the recorder to record programs from connected equipment that has a timer function (such as a satellite tuner) to a DVD disc.
to Video	Sets the recorder to record programs from connected equipment that has a timer function (such as a satellite tuner) to a VHS tape.

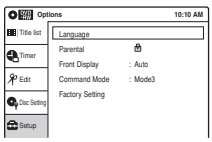
Language, Parental Control Settings/Factory Settings (Options)

The "Options" setup allows you to set up other operational settings.

1 Press SYSTEM MENU while the recorder is in stop mode.

2 Select "Setup," and press ENTER.

3 Select "Options," and press ENTER.
The "Options" setup appears with the following options. The default settings are underlined.



Language

◆ **OSD (On-Screen Display)**
Switches the display language on the screen.

◆ **Disc Menu (DVD VIDEO only)**
Switches the language for the DVD menu.

◆ **Audio (DVD VIDEO only)**
Switches the language of the sound track.
When you select "Original," the language given priority in the disc is selected.

◆ **Subtitle (DVD VIDEO only)**
Switches the language of the subtitles recorded on the disc.
When you select "Auto," the subtitle language changes according to the language you selected for the sound track.

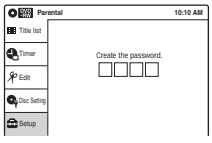
Note

If you select a language in "Disc Menu," "Subtitle," or "Audio" that is not recorded on the DVD VIDEO, one of the recorded languages will be automatically selected.

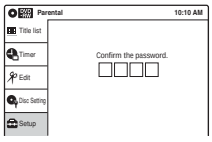
Parental (DVD VIDEO only)

Playback of some DVD VIDEOs can be limited according to a predetermined level, such as the age of the users. Scenes may be blocked or replaced with different scenes.

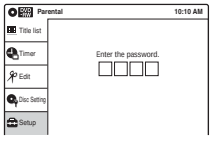
1 After step 3 above, select "Parental," and press ENTER.
- If you have not entered a password, the display for registering a new password appears.
  Enter a 4-digit password using the number buttons.



The display for confirming the password appears.
Re-enter the password.

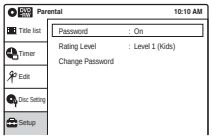


- When you have already registered a password, the display for entering the password appears.
  Enter a 4-digit password using the number buttons.

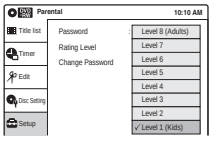


2 Select "Password," and press ENTER.
The selection items for "Password" are displayed.

3 Select "On," and press ENTER.



4 Select "Rating Level," and press ENTER.
The selection items for "Rating Level" are displayed.



The lower the value, the stricter the limitation.

5 Select the level, and press ENTER.
The Parental setting is complete.

- To cancel the Parental setting for the disc, set "Password" to "Off" in step 3.
- To change the password, select "Change Password" in step 5, and press ENTER. When the display for registering a password appears, enter a new four-digit password using the number buttons.

Notes

- If you forget your password, select "Factory Setting" of "Options" in the "Setup" display.
- When you play discs which do not have the Parental Control function, playback cannot be limited on this recorder.
- Depending on the disc, you may be asked to change the Parental Control level while playing the disc. In this case, enter your password, then change the level.

Front Display

Adjusts the lighting of the front panel display.

Auto	Adjusts automatically.
Bright	Bright lighting.
Dimmer	Low lighting. Turns off the lighting when the power is off.

Command Mode

Changes the command mode of the recorder if other DVD equipment is assigned the same command mode. Be sure to match the COMMAND MODE switch on the remote to the setting made here. For details, see "If you have a Sony DVD Player/Video Cassette Recorder or Video Cassette Recorder/DVD Recorder" on page 29.

Mode1	Select this if the default command mode conflicts with other DVD equipment.
Mode2	Select this if the default command mode conflicts with other DVD equipment.
Mode3	The default command mode of the recorder.

Factory Setting

Allows you to return the setup settings to their default settings. Note that all of your previous settings will be lost.

1 After step 3 above, select "Factory Setting," and press ENTER.

2 Select "Start," and press ENTER.
The setup settings return to their default settings.

3 Press I/⏻ to turn off the recorder, and press I/⏻ again to turn it on.
The "Easy Setup" display appears. Follow the instructions for Easy Setup (page 30) from step 5.

➡continued

Easy Setup (Resetting the Recorder)

Select this to run the Easy Setup program.

1 Press SYSTEM MENU while the recorder is in stop mode.

2 Select "Setup," and press ENTER.

3 Select "Easy Setup," and press ENTER.

4 Select "Start," and press ENTER.

5 Follow the instructions for Easy Setup (page 30) from step 5.

Troubleshooting

If you experience any of the following difficulties while using the recorder, use this troubleshooting guide to help remedy the problem before requesting repairs. Should any problem persist, consult your nearest Sony dealer.

Power

The power does not turn on.
➡ Check that the AC power cord is connected securely.

Picture

There is no picture.
➡ Re-connect all connecting cords securely.
➡ The connecting cords are damaged.
➡ Check the connection to your TV (page 15).
➡ Switch the input selector on your TV (such as to "VCR") so that the signal from the recorder appears on the TV screen.

Picture noise appears.
➡ Check the connection to your TV (page 15) and switch the input selector on your TV so that the signal from the recorder appears on the TV screen.
➡ If the picture output signal from your recorder passes through your VCR to get to your TV, or if you are connected to a combination TV/VIDEO player, the copy-protection signal applied to some DVD programs could affect picture quality. If you still experience this problem even when you connect your recorder directly to your TV, try connecting your recorder to your TV's S VIDEO input.
➡ You have set the recorder to progressive format (the PROGRESSIVE indicator lights up) even though your TV cannot accept the progressive signal. In this case, set "Progressive" to "Off" in "Video" setup (page 101).
➡ Even if your TV is compatible with progressive format (480p) signals, the image may be affected when you set the recorder to progressive format. In this case, set "Progressive" to "Off" in "Video" setup (page 101).

TV program reception does not fill the screen.
➡ Set the channel manually in "Tuner Preset" setup (page 97).
➡ Select the correct source using the INPUT SELECT button, or select a channel of any TV program using the CH +/– buttons.

TV program pictures are distorted.
➡ Reorient the TV antenna.
➡ Adjust the picture (see the TV's instruction manual).
➡ Place the recorder and TV farther apart.
➡ Place the TV and any bunched antenna cables farther apart.
➡ The RF cable is connected to the VHF/UHF OUT jack on the recorder. Connect the cable to the VHF/UHF IN jack.

TV channels cannot be changed.
➡ The channel is disabled (page 98).
➡ A timer recording started, which changed the channels.

The picture from equipment connected to the recorder's input jack does not appear on the screen.
➡ If the equipment is connected to the LINE 1 IN jack, select "LINE1" in the front panel display by pressing INPUT SELECT.
If the equipment is connected to the LINE 2 IN jacks, select "LINE2" in the front panel display by pressing INPUT SELECT.

The playback picture or TV program from the equipment connected through the recorder is distorted.
➡ If the playback picture output from a DVD player, VCR, or tuner goes through your recorder before reaching your TV, the copy-protection signal applied to some programs could affect picture quality. Disconnect the playback equipment in question and connect it directly to your TV.

The picture does not fill the screen.
➡ Set "TV Type" in "Video" setup in accordance with the aspect ratio of your TV (page 100).

The picture does not fill the screen, even though the aspect ratio is set in "TV Type" in "Video" setup.
➡ The aspect ratio of the disc is fixed on your DVD.

Sound

There is no sound.
➡ Re-connect all connections securely.
➡ The connecting cord is damaged.
➡ The input source setting on the amplifier or the connection to the amplifier is incorrect.
➡ The recorder is in reverse play, fast-forward, slow motion, or pause mode.
➡ If the audio signal does not come through the DIGITAL AUDIO OUT (OPTICAL or COAXIAL) jacks, check the "Audio" setup settings (page 102).

Sound is noisy.
➡ When playing a CD with DTS sound tracks, noise will come from the LINE OUT (AUDIO L/R) jacks (page 61).

The sound volume is low
➡ The sound volume is low on some DVDs. The sound volume may improve if you set "Audio DRC" in "Audio" setup to "TV Mode" (page 103).

An alternate audio track cannot be recorded or played.
➡ Second Audio Program (SAP) is not available for all programs. The program you are recording does not have a second audio program.
➡ You have set "Tuner Audio" in "Audio" setup to "Main" (page 102). Select "SAP" to record alternate audio programs.
➡ If you have connected an AV amplifier to the DIGITAL AUDIO OUT (OPTICAL or COAXIAL) jack and want to change the audio track for a DVD-RW (VR mode) during playback, set "Dolby Digital" in "Audio" setup to "D-PCM" (page 102).

DVD Playback

The disc does not play.
➡ The disc is upside down. Insert the disc with the labeled side facing up.
➡ The disc is not correctly inserted.
➡ Moisture has condensed inside the recorder. Remove the disc and leave the recorder turned on for about half an hour until the moisture evaporates.
➡ If the disc was recorded on another recorder, the recorder cannot play the disc if it was not finalized (page 44).

The disc does not start playback from the beginning.
➡ Resume play was activated (page 58).
➡ You have inserted a disc whose Title menu or DVD menu automatically appears on the TV screen when it is first inserted. Use the menu to start playback.

The recorder starts playing the disc automatically.
➡ The DVD VIDEO features an auto playback function.

Playback stops automatically.
➡ If the disc has an auto pause signal, the recorder stops playback at the auto pause signal.

Some functions such as Stop, Search, or Slow-motion Play cannot be performed.
➡ Depending on the disc, you may not be able to do some of the operations above. See the instruction manual supplied with the disc.

The language for the sound track cannot be changed.
➡ Multilingual tracks are not recorded on the disc being played.
➡ The DVD VIDEO prohibits the changing of the language for the sound track.
➡ Try changing the language using the DVD VIDEO's menu.

The subtitle language cannot be changed or turned off.
➡ Multilingual subtitles are not recorded on the DVD VIDEO.
➡ The DVD VIDEO prohibits changing of the subtitles.
➡ Try changing the subtitle using the DVD VIDEO's menu.
➡ The subtitles cannot be changed for the titles recorded on this recorder.

The angles cannot be changed.
➡ Multi-angles are not recorded on the DVD VIDEO being played.
➡ You are trying to change the angles when "" does not appear in the front panel display (page 59).
➡ The DVD VIDEO prohibits changing angles.
➡ Try changing the angle using the DVD VIDEO's menu.
➡ The angles cannot be changed for the titles recorded on this recorder.

The MP3 audio track cannot be played.
➡ The DATA CD is not recorded in the MP3 format that conforms to ISO9660 Level 1/Level 2.
➡ The MP3 audio track does not have the extension ".MP3."
➡ The data is not formatted in MP3 even though it has the extension ".MP3."
➡ The data is not MPEG1 Audio Layer 3 data.
➡ The player cannot play audio tracks in MP3PRO format.

The JPEG image file cannot be played.
➡ The DATA CD is not recorded in JPEG format that conforms to ISO9660 Level 1/Level 2.
➡ The JPEG image file does not have the extension ".JPG" or ".JPEG."
➡ The data is not formatted in JPEG even though it has the extension ".JPG" or "JPEG."
➡ Length or width of the image is more than 4,720 dots.

The title of the MP3 audio album/ track or JPEG image album/file is not correctly displayed.
➡ The player can only display numbers and alphabet. Other characters are displayed as asterisks.

DVD Recording/Timer recording/ Editing

The channel cannot be changed from the channel you are recording.
➡ Set the TV's input source to "TV."

Recording does not start immediately after you press ● REC.
➡ Operate the recorder only after "LOAD," "FORMAT," or "INF WRITE" disappears from the front panel display.

Nothing was recorded even though you set the timer setting correctly.
➡ There was a power failure during recording.
➡ Disconnect the AC power cord from the AC outlet, and connect it again.
➡ The program contains copy protection signals that restrict copying.
➡ The program that starts first has priority and the second program starts recording only after the first program has finished. If the programs start at the same time, the program listed first in the menu has priority (page 51).
➡ There is no DVD inside the recorder.
➡ There is not enough disc space for the recording.

Recording does not stop immediately after you press ■ STOP.
➡ It will take a few seconds for the recorder to input disc data before recording can stop.

Timer recording is not complete or did not start from the beginning.
➡ There was a power failure during recording. If the power recovers when there is a timer recording, the recorder resumes recording. The clock is automatically set by EDS, but it is reset during a power failure when the EDS signal cannot be received (page 99).
➡ The program that starts first has priority and the second program starts recording only after the first program has finished. If the programs start at the same time, the program listed first in the menu has priority (page 51).
➡ Disc space was not enough.

➡continued

Contents previously recorded were erased.
➡ Data that has been recorded on a DVD with a PC will be erased from the disc when the disc is inserted.

VHS Playback

The playback picture does not appear on the TV screen.
➡ Make sure the TV is set to the channel for the VCR. If you are using a monitor, set it to video input.

The picture is not clear.
➡ Adjust the tracking with the TRACKING +/– buttons.
➡ The video heads are dirty (see page 113). Clean the video heads using a Sony video head cleaning cassette. If a Sony cleaning cassette is not available in your area, have the heads cleaned at your nearest Sony dealer (a standard service fee will be charged). Do not use a commercially available liquid type cleaning cassette, as it may damage the video heads.
➡ The video heads may have to be replaced. Consult your local Sony dealer for more information.

The picture rolls vertically during picture search.
➡ Adjust the vertical hold control on the TV or monitor.

The picture has no sound.
➡ The tape is defective.
➡ If you made A/V connections, check the audio cord connection.

VHS Recording

The channel cannot be changed from the channel you are recording.
➡ Set the TV's input source to "TV."

A TV program does not appear on the TV screen.
➡ Make sure the TV is set to the channel for the VCR. If you are using a monitor, set it to video input.
➡ Select the correct source with the CH +/– or INPUT SELECT buttons. Select a channel number when recording TV programs; select "LINE1" or "LINE2" when recording from other equipment.

TV reception is poor.
➡ Adjust the TV antenna.

The tape starts playing as soon as it is inserted.
➡ The safety tab has been removed. To record on this tape, cover the tab hole.

The tape is ejected when you press ● REC.
➡ Check that the safety tab has not been removed.

Nothing happens when you press ● REC.
➡ Make sure the tape is not at its end.

VHS Timer recording

The timer does not operate.
➡ Check that the clock is set.
➡ Make sure a tape has been inserted.
➡ Check that the safety tab has not been removed.
➡ Make sure the tape is not at its end.
➡ Make sure a program has been set for timer recording.
➡ Make sure your timer settings are past the current time.
➡ Check that the cable box is turned on.
➡ The clock stops if the VCR-DVD recorder is disconnected from the wall outlet for more than one minute. Reset the clock and timer.
➡ Turn the power off and unplug the AC power cord.
➡ The timer recording will not be activated if the recorder is on at the preset time.
➡ The program that starts first has priority and the second program starts recording only after the first program has finished. If the programs start at the same time, the program listed first in the menu has priority (page 70).

Additional Information

➡continued

VHS Others

A tape cannot be inserted.
➡ Check that a tape is not already in the tape compartment.

Display

The clock has stopped.
➡ Set the clock again (page 99).

The ⏲ indicator is flashing.
➡ The disc does not have enough space.
➡ Insert a recordable disc or a tape with its safety tab in place inside the recorder.

Remote control

The remote does not function.
➡ Batteries are weak.
➡ The remote is too far from the recorder.
➡ The remote's manufacturer code returned to the default setting when you replaced the batteries. Reset the code (page 26).
➡ Turn on the recorder.
➡ The remote is not pointed at the remote sensor on the recorder.
➡ Different command modes are set for the recorder and remote. Set the same command mode (page 29).
➡ Slide the TV/DVD·VIDEO switch to DVD·VIDEO (page 27).

Other Sony equipment responds to the remote.
➡ The same command mode is set for both the Sony DVD Player/Video Cassette Recorder or Video Cassette Recorder/DVD Recorder and recorder. Set a different command mode for the recorder (page 29).

Others

The recorder does not operate properly.
➡ Restart the recorder. Press down I/⏻ on the recorder for more than ten seconds until "SONY DVD" appears in the front panel display.
➡ When static electricity, etc., causes the recorder to operate abnormally, turn off the recorder and wait until the clock appears in the front panel display. Then, unplug the recorder and after leaving it off for a while, plug it in again.

The disc tray does not open after you press ⏏ OPEN/CLOSE.
➡ It may take a few seconds for the disc tray to open after you have recorded or edited a disc. This is because the recorder is adding disc data to the disc.

The disc tray does not open and "TRAY LOCKED" appears in the front panel display.
➡ Contact your Sony dealer or local authorized Sony service facility.

"CAN NOT RECORD BECAUSE OF HIGH TEMP." appears in the front panel display.
➡ Check that the vent on the rear of the recorder is not blocked. Then, turn off the recorder, wait until the clock appears in the front panel display, and disconnect the AC power cord. Leave the recorder off for a while, then re-connect the power cord, and press I/⏻ on the recorder.

"CHILD LOCK" appears in the front panel display.
➡ The recorder is locked. Cancel the Child Lock (page 58).

Control by AV mouse is not possible.
➡ Some satellite receivers may not support AV mouse.

Notes About This Recorder

On operation
- If the recorder is brought directly from a cold to a warm location, or is placed in a very damp room, moisture may condense on the lenses inside the recorder. Should this occur, the recorder may not operate properly. In this case, remove the disc and leave the recorder turned on for about half an hour until the moisture evaporates.
- When you move the recorder, take out any discs. If you don't, the disc may be damaged.

On adjusting volume
Do not turn up the volume while listening to a section with very low level inputs or no audio signals. If you do, the speakers may be damaged when a peak level section is played.

On cleaning
Clean the cabinet, panel, and controls with a soft cloth slightly moistened with a mild detergent solution. Do not use any type of abrasive pad, scouring powder or solvent such as alcohol or benzine.

On cleaning discs
Do not use a commercially available cleaning disc. It may cause a malfunction.

Notes about the discs
- To keep the disc clean, handle the disc by its edge. Do not touch the surface. Dust, fingerprints, or scratches on the disc may cause it to malfunction.

- Do not expose the disc to direct sunlight or heat sources such as hot air ducts, or leave it in a car parked in direct sunlight as the temperature may rise considerably inside the car.
- After playing, store the disc in its case.
- Clean the disc with a cleaning cloth. Wipe the disc from the center out.

- Do not use solvents such as benzine, thinner, commercially available cleaners, or anti-static spray intended for vinyl LPs.
- Do not use the following discs.
  – A disc that has a non-standard shape (e.g., card, heart).
  – A disc with a label or sticker on it.
  – A disc that has cellophane tape or sticker adhesive on it.

On cleaning the VCR mechanism
Clean the cabinet, panel, and controls with a dry, soft cloth, or a soft cloth slightly moistened with a mild detergent solution. Do not use any type of solvent, such as alcohol or benzine.

Symptoms caused by contaminated video heads

Additional Information

About i.LINK

The DV IN jack on this recorder is an i.LINK-compliant DV IN jack. This section describes the i.LINK standard and its features.

What is i.LINK?
i.LINK is a digital serial interface for handling digital video, digital audio and other data in two directions between equipment having the i.LINK jack, and for controlling other equipment. i.LINK-compatible pieces of equipment can be connected by a single i.LINK cable. Possible applications are operations and data transactions with various digital AV equipment. When two or more i.LINK-compatible equipment are connected to this recorder in a daisy chain, operations and data transactions are possible with not only the equipment that this recorder is connected to but also with other devices via the directly connected equipment.
Note, however, that the method of operation sometimes varies according to the characteristics and specifications of the equipment to be connected, and that operations and data transactions are sometimes not possible on some connected equipment.

Note
Normally, only one piece of equipment can be connected to this recorder by the i.LINK cable (DV connecting cable). When connecting this recorder to i.LINK-compatible equipment having two or more i.LINK jacks (DV jacks), see the instruction manual of the equipment to be connected.

About the name "i.LINK"

i.LINK is a more familiar term for IEEE 1394 data transport bus proposed by SONY, and is a trademark approved by many corporations. IEEE 1394 is an international standard standardized by the Institute of Electrical and Electronics Engineers.

Additional Information

➡continued

i.LINK baud rate

i.LINK's maximum baud rate varies according to the equipment. Three maximum baud rates are defined:

S100 (approx. 100 Mbps*)
S200 (approx. 200 Mbps)
S400 (approx. 400 Mbps)

The baud rate is listed under "Specifications" in the instruction manual of each equipment. It is also indicated near the i.LINK jack on some equipment.
The maximum baud rate of equipment on which it is not indicated such as this unit is "S100."
When units are connected to equipment having a different maximum baud rate, the baud rate sometimes differs from the indicated baud rate.

* What is Mbps?
Mbps stands for megabits per second, or the amount of data that can be sent or received in one second. For example, a baud rate of 100 Mbps means that 100 megabits of data can be sent in one second.

i.LINK functions on this recorder

For details on how to dub when this recorder is connected to other video equipment having DV jacks, see page 93.
The DV jack on this recorder can only input DVC-SD signals. It cannot output signals. The DV jack will not accept MICRO MV signals from equipment such as a MICRO MV digital video camera with an i.LINK jack.
For further precautions, see the notes on page 93.
For details on precautions when connecting this recorder, also see the instruction manuals for the equipment to be connected.

Required i.LINK cable

Use the Sony i.LINK 4-pin-to-4-pin cable (during DV dubbing).

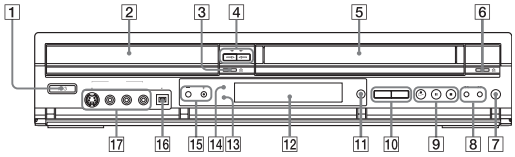
i.LINK and i are trademarks.

Guide to Parts and Controls

For more information, see the pages in parentheses.

Front panel

Buttons on the recorder have the same function as the buttons on the remote if they have the same or similar names.



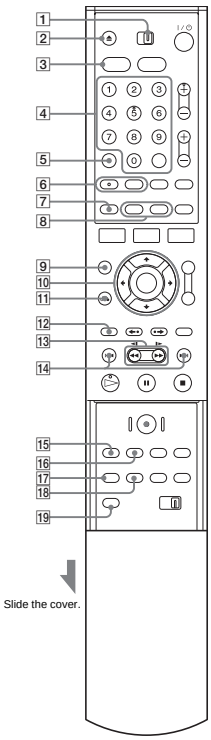
1 I/⏻ (on/standby) button (30)
2 Disc tray (37, 48, 57)
3 ⏏ (open/close) button (37, 48, 57)
4 DVD → button (91)
← VIDEO button (89)
5 Tape compartment (37, 67, 76)
6 ⏏ (eject) button (76)
7 ● REC (record) button (38, 39, 48, 67)
8 ◀◀/▶▶ (rewind/fast-forward) buttons (59, 78)
9 ▷ (play) button (37, 57, 76)*
❚❚ (pause) button (48, 59, 67, 78)
■ (stop) button (37, 48, 57, 67, 76, 89)
10 SELECT DVD/VIDEO buttons (37)
11 (remote sensor) (26)
12 Front panel display (45, 121)
13 SYNCHRO REC indicator (53, 72)
14 PROGRESSIVE indicator (21, 100)
15 CHANNEL/TRACKING +/– buttons* (38, 39, 48, 67, 77)
16 DV IN jack (93)
17 LINE 2 IN (S VIDEO/VIDEO/AUDIO L/R) jacks (34)

* ▷ and CHANNEL + buttons have a tactile dot. Use the tactile dot as a reference.

Additional Information

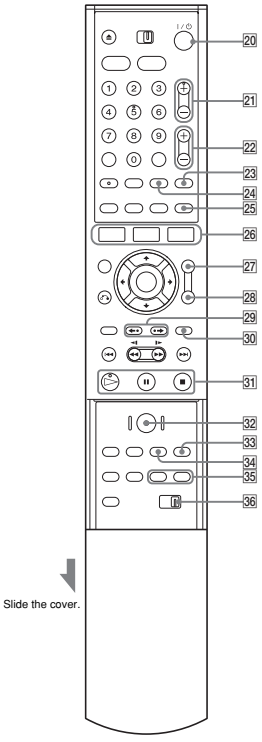
Remote for DVD

Buttons on the remote have the same function as the buttons on the recorder if they have the same or similar names. Buttons with an orange dot next to them can be used with your TV when the TV/DVD·VIDEO switch is set to TV.



1 TV/DVD·VIDEO switch (27)
2 ⏏ OPEN/CLOSE button (37, 48, 57, 94)
3 DVD button (37)
4 Number buttons (27, 52)*
SET button (27)
5 CLEAR button (52, 62)
6 AUDIO button (59)*
SUBTITLE button (59)
7 VCR Plus+ button (52)
8 DISPLAY button (45, 50)
TIME/TEXT button (45)
9 ORIGINAL/PLAYLIST button (42, 82)
10 ↑/↓/←/→/ENTER button (30)
11 RETURN button (30)
12 TOP MENU button (57)
13 ◀◀◀❚/❚▶▶▶ (search) buttons (59)
14 ⏮ PREV (previous)/NEXT ⏭ buttons (59)
15 REC MODE button (38, 48, 94)
16 TIMER button (50)
17 MARKER button (62)
18 SEARCH button (62)
19 SHUFFLE button (59)

* Number 5 and AUDIO buttons have a tactile dot. Use the tactile dot as a reference.



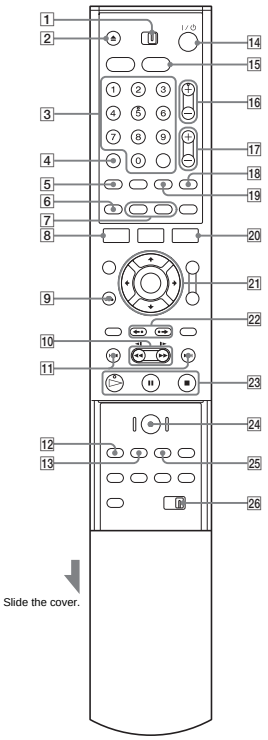
20 I/⏻ (on/standby) button (30)
21 CH +/– (channel) buttons* (38, 48)
22 VOL (volume) +/– buttons (27)
23 TV/VIDEO button (27)
24 INPUT SELECT button (38, 48, 94)
25 SURROUND button (59)
26 SYSTEM MENU button (40)
TITLE LIST button (42, 57, 82)
TOOLS button (41)
27 ZOOM button (59)
28 ANGLE button (59)
29 ←• INSTANT REPLAY/•→ INSTANT ADVANCE buttons (59)
30 MENU button (57)
31 ▷ PLAY button* (37, 57, 83)
❚❚ PAUSE button (48, 59, 83)
■ STOP button (37, 48, 57, 83, 89)
32 ● REC (record) button (38, 48)
33 REPEAT button (59)
34 SYNCHRO REC button (53)
35 CHAPTER MARK/ERASE buttons (84)
36 COMMAND MODE switch (DVD COMBO 1, 2, 3) (29)

* CH + and ▷ PLAY buttons have a tactile dot. Use the tactile dot as a reference.

Additional Information

Remote for VIDEO

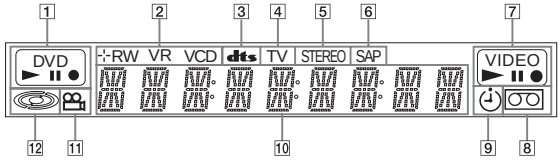
Buttons on the remote have the same function as the buttons on the recorder if they have the same or similar names. Buttons with an orange dot next to them can be used with your TV when the TV/DVD·VIDEO switch is set to TV.



1 TV/DVD·VIDEO switch (27)
2 ⏏ OPEN/CLOSE (eject) button (76)
3 Number buttons (27, 71)*
SET button (27, 67)
4 CLEAR button (71, 76)
5 AUDIO button (80)*
6 VCR Plus+ button (71)
7 DISPLAY button (45, 69, 76)
TIME/TEXT button (45)
8 SYSTEM MENU button (40)
9 RETURN button (30)
10 ◀◀ / ▶▶ (search) buttons (78)
11 ⏮ PREV (previous)/NEXT ⏭ buttons (78)
12 REC MODE button (39, 67)
13 TIMER button (69)
14 I/⏻ (on/standby) button (30)
15 VIDEO button (37)
16 CH (channel)/TRACKING +/– buttons* (39, 67, 77)
17 VOL (volume) +/– buttons (27)
18 TV/VIDEO button (27)
19 INPUT SELECT button (39, 67)
20 TOOLS button (41)
21 ↑/↓/←/→/ENTER button (30)
22 ←• INSTANT REPLAY/•→ INSTANT ADVANCE buttons (78)
23 ▷ PLAY button* (37, 76)
❚❚ PAUSE button (67, 78)
■ STOP button (37, 67, 76)
24 ● REC (record) button (39, 67)
25 SYNCHRO REC button (72)
26 COMMAND MODE switch (DVD COMBO 1, 2, 3) (29)

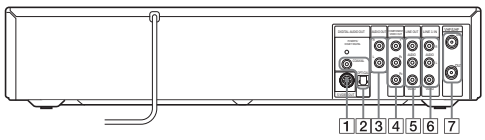
* Number 5, AUDIO, CH +, and ▷ PLAY buttons have a tactile dot. Use the tactile dot as a reference.

Front panel display



1 DVD Playing/recording status
2 Disc type*/recording format
3 Audio signal indicators
4 TV indicator
5 STEREO indicator (47, 67)
6 SAP (Second Audio Program) indicator (47)
7 VIDEO Playing/recording status
8 Tape indicator
9 Timer indicator
10 Displays the following (45):
• Playing time/remaining time
• Current title/chapter/track/index number
• Recording time/recording mode
• Clock
• Channel
11 (angle) indicator (59)
12 Disc indicator

Rear panel



1 S VIDEO OUT jack (20)
2 DIGITAL AUDIO OUT (COAXIAL/OPTICAL) jacks (25)
3 AUDIO OUT L/R jacks (25)
4 COMPONENT VIDEO OUT (Y, PB, PR) jacks (21)
5 LINE OUT (AUDIO L/R/VIDEO) jacks (18, 23)
6 LINE 1 IN (AUDIO L/R/VIDEO) jacks (35)
7 VHF/UHF IN/OUT jacks (15)

Glossary

Chapter (page 62)
Sections of a picture or a music feature that are smaller than titles. A title is composed of several chapters. Depending on the disc, no chapters may be recorded.

Copy protection signals (page 48)
Copy restriction set by copyright owners, etc. These signals are included in some software or TV programs and restrict recording on this recorder.

Dolby Digital (page 102)
Digital audio compression technology developed by Dolby Laboratories. This technology conforms to multi-channel surround sound. The rear channel is stereo and there is a discrete subwoofer channel in this format. Dolby Digital provides the same discrete channels of high quality digital audio found in "Dolby Digital" theater surround sound systems. Good channel separation is realized because all of the channel data is recorded discretely, and little deterioration occurs because all channel data processing is digital.

DTS (page 102)
Digital audio compression technology by Digital Theater Systems, Inc. This technology conforms to multi-channel surround sound. The rear channel is stereo and there is a discrete subwoofer channel in this format. DTS provides the same discrete channels of high quality digital audio.
Good channel separation is realized because all of the channel data is recorded discretely, and little deterioration occurs because all channel data processing is digital.

DVD+RW (page 10)
A DVD+RW (read "plus RW") is a recordable and rewritable disc. DVD+RWs use a recording format that is comparable to the DVD VIDEO format.

DVD-RW (page 10)
A DVD-RW is a recordable and rewritable disc that is the same size as a DVD VIDEO. The DVD-RW has two different modes: VR mode and Video mode. DVDs created in Video mode have the same format as a DVD VIDEO, while discs created in VR (Video Recording) mode allow the contents to be programmed or edited.

DVD+R (page 10)
A DVD+R (read "plus R") is a recordable disc that is the same size as a DVD VIDEO. Contents can be recorded only once to a DVD+R, and will have the same format as a DVD VIDEO.

DVD-R (page 10)
A DVD-R is a recordable disc that is the same size as a DVD VIDEO. Contents can be recorded only once to a DVD-R, and will have the same format as a DVD VIDEO.

DVD VIDEO (page 10)
A disc that contains up to eight hours of moving pictures on a disc the same diameter as a CD. The data capacity of a single-layer and single-sided DVD is 4.7 GB (Giga Byte), which is 7 times that of a CD. The data capacity of a double-layer and single-sided DVD is 8.5 GB, a single-layer and double-sided DVD is 9.4 GB, and double-layer and double-sided DVD is 17 GB. The picture data uses the MPEG 2 format, which is a worldwide standard of digital compression technology. The picture data is compressed to about 1/40 (average) of its original size. The DVD also uses a variable rate coding technology that changes the data to be allocated according to the status of the picture. Audio information is recorded in a multi-channel format, such as Dolby Digital, allowing you to enjoy a more real audio presence.
Furthermore, various advanced functions such as the multi-angle, multilingual, and Parental Control functions are provided on the DVD.

Interlace format (page 101)
Interlace format shows every other line of an image as a single "field" and is the standard method for displaying images on television. The even number field shows the even numbered lines of an image, and the odd numbered field shows the odd numbered lines of an image.

Original (page 81)
Titles actually recorded on a DVD-RW (VR mode). Erasing original titles frees up disc space.

Playlist (page 81)
Playback information created from the actual recordings on a DVD-RW (VR mode). A Playlist leaves the original titles as they are, and contains only the information needed to control playback. A Playlist title takes up very little disc space.

Progressive format (page 101)
Compared to the Interlace format that alternately shows every other line of an image (field) to create one frame, the Progressive format shows the entire image at once as a single frame. This means that while the Interlace format can show 30 frames/60 fields in one second, the Progressive format can show 60 frames in one second. The overall picture quality increases and still images, text, and horizontal lines appear sharper.

Title (page 62)
The longest section of a picture or music feature on a DVD, movie, etc., in video software, or the entire album in audio software.

Track (page 62)
Sections of a music feature on a CD (the length of a song).

DVD Audio/Subtitle Language

Abbreviation	Language
ARA	Arabic
BUL	Bulgarian
CHI	Chinese
CRO	Croatian
CZE	Czech
DAN	Danish
DEU	German
ENG	English
ESP	Spanish
FIN	Finish
FRA	French
GRE	Greek
HUN	Hungarian
IDN	Indonesian
IND	Hindi
ISL	Icelandic
ITA	Italian
IWR	Hebrew
JPN	Japanese
KOR	Korean
MAL	Malay
NLD	Dutch
NOR	Norwegian
POL	Polish
POR	Portuguese
RUS	Russian
SVE	Swedish
THA	Thai
TUR	Turkish
VIE	Vietnamese
ZAF	Afrikaans

MEMO

2. DISASSEMBLY AND REASSEMBLY

2-1 CABINET AND PCB

2-1-1 Cabinet Top Removal

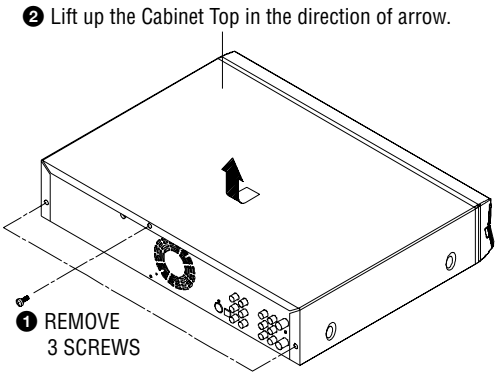


Fig. 2-1 Cabinet Top Removal

2-1-2 Ass'y Botton Cover Removal

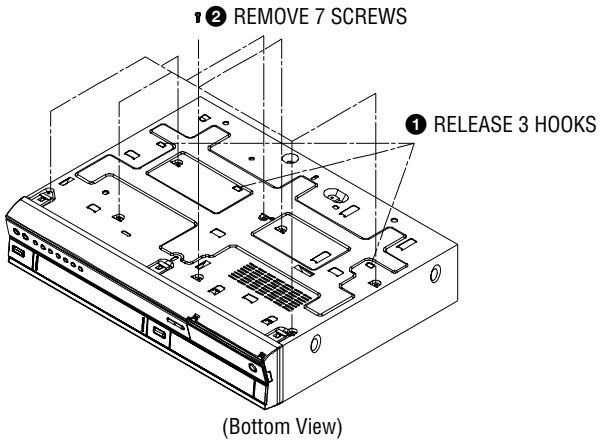


Fig. 2-2 Ass'y Botton Cover Removal

2-1-3 Ass'y Front Panel Removal

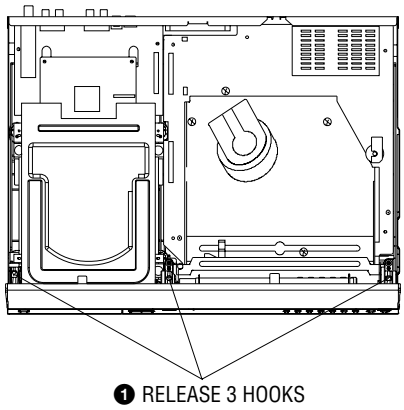


Fig. 2-3 Ass'y Front Panel Removal (Top View)

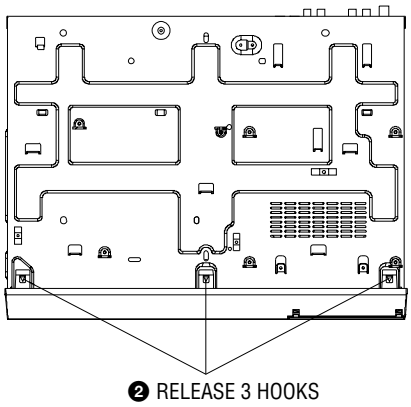


Fig. 2-4 Ass'y Front Panel Removal (Bottom View)

2-1-4 Chassis Removal

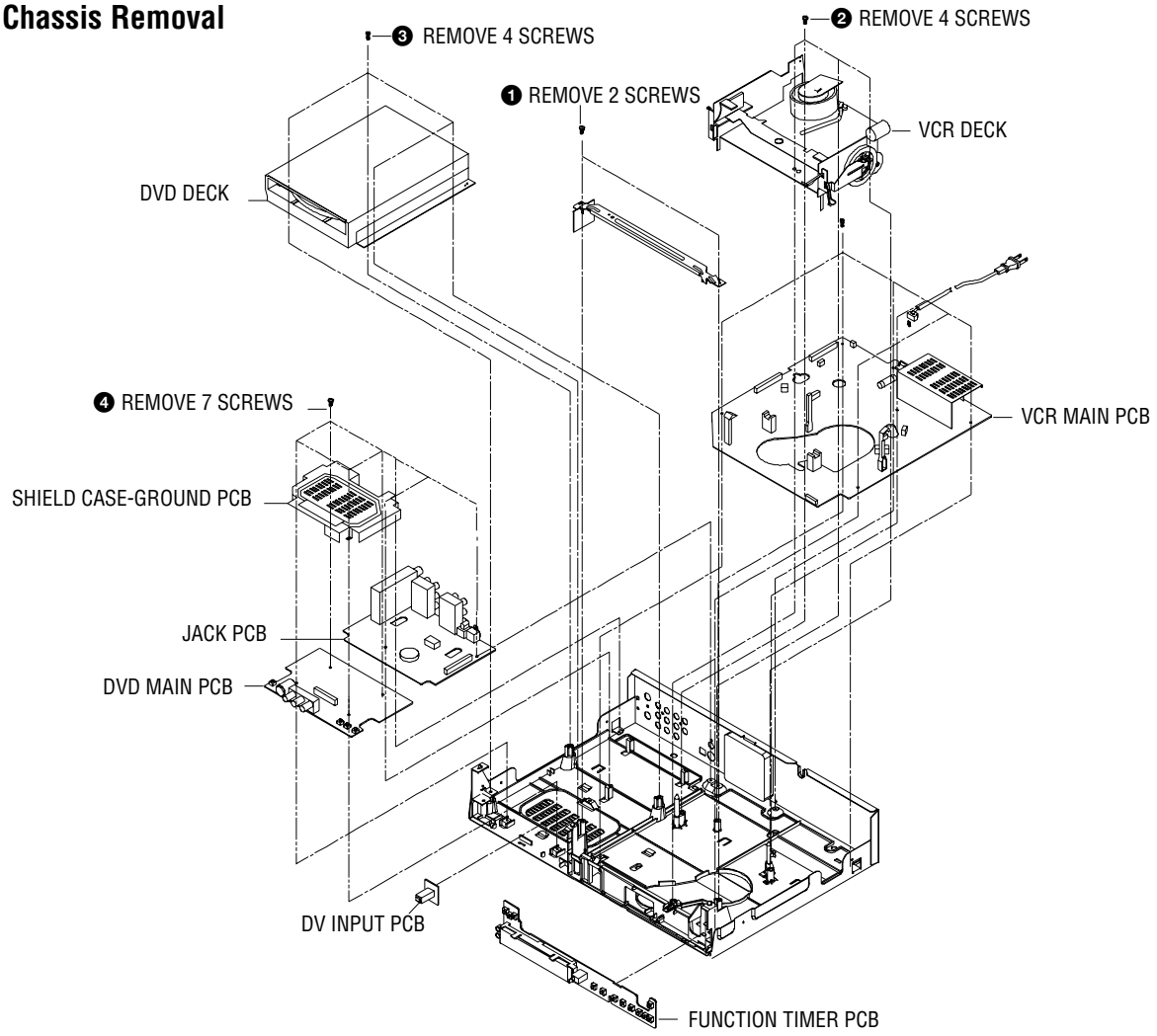


Fig. 2-5 Chassis Removal

2-1-5 VCR Main PCB Removal

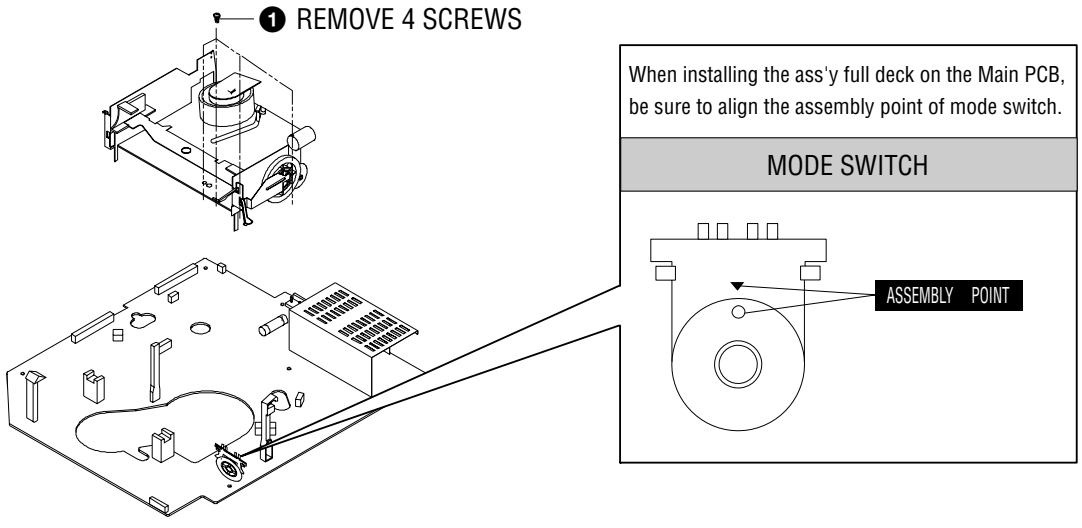

❶ REMOVE 4 SCREWS
When installing the ass'y full deck on the Main PCB, be sure to align the assembly point of mode switch.
MODE SWITCH
ASSEMBLY POINT

Fig. 2-6 VCR Main PCB Removal

2-2 CIRCUIT BOARD LOCATIONS

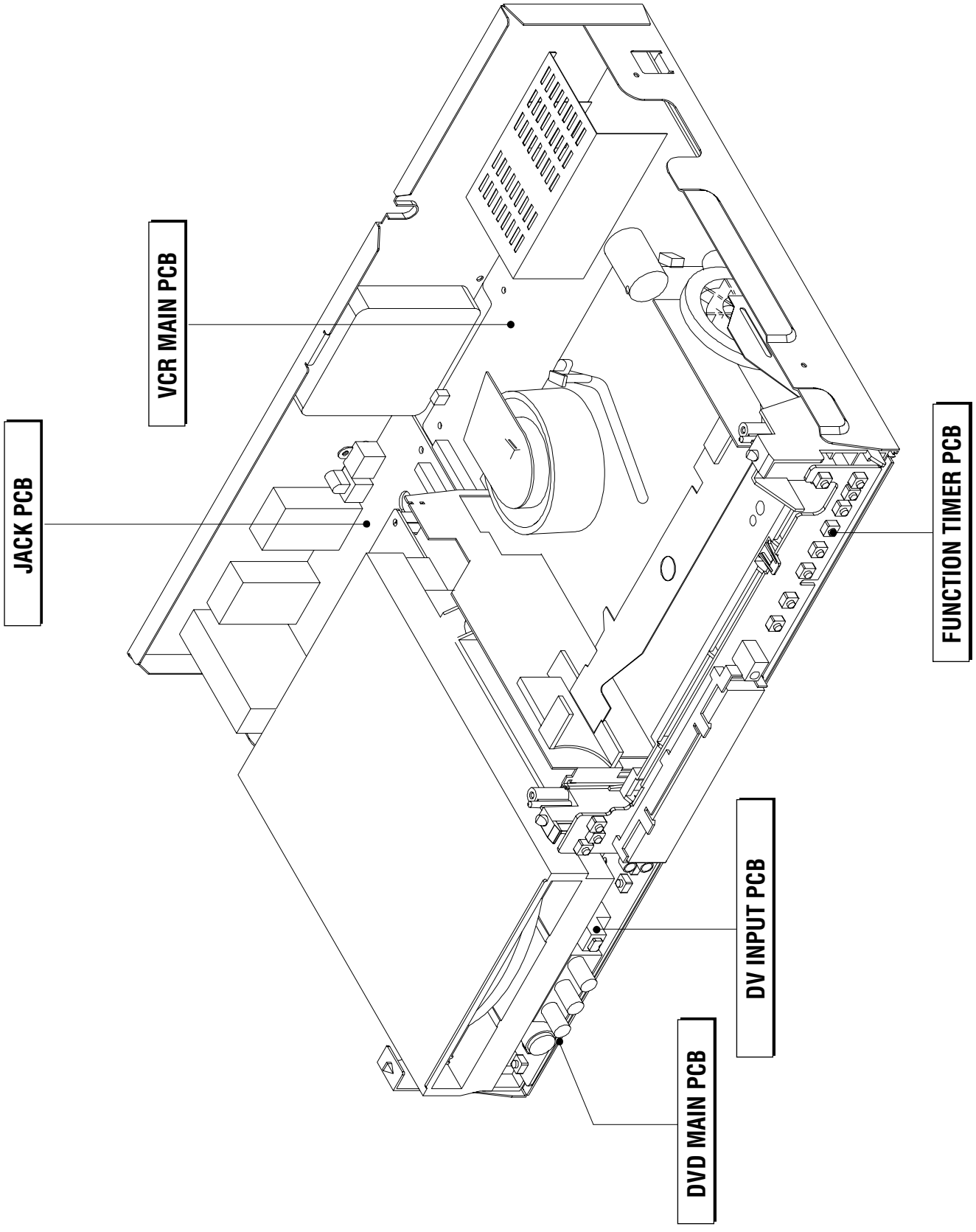


Fig. 2-7 Circuit Board Locations

2-3 VCR DECK PARTS LOCATIONS

2-3-1 Top View

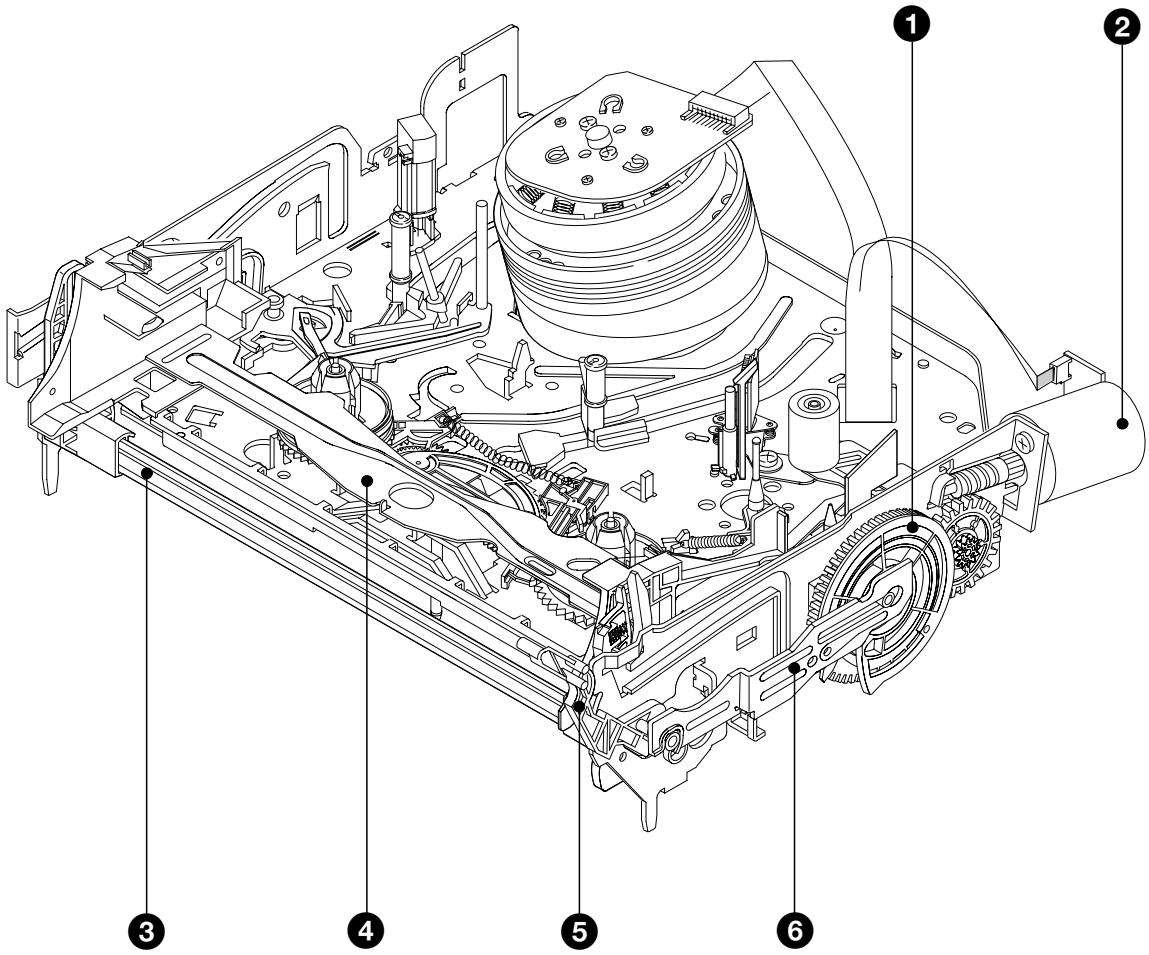


Fig. 2-8 Top parts Location-1

1. GEAR FL CAM
2. MOTOR LOADING ASS'Y
3. LEVER FL ARM ASS'Y
4. HOLDER FL CASSETTE ASS'Y
5. LEVER FL DOOR
6. SLIDER FL DRIVE

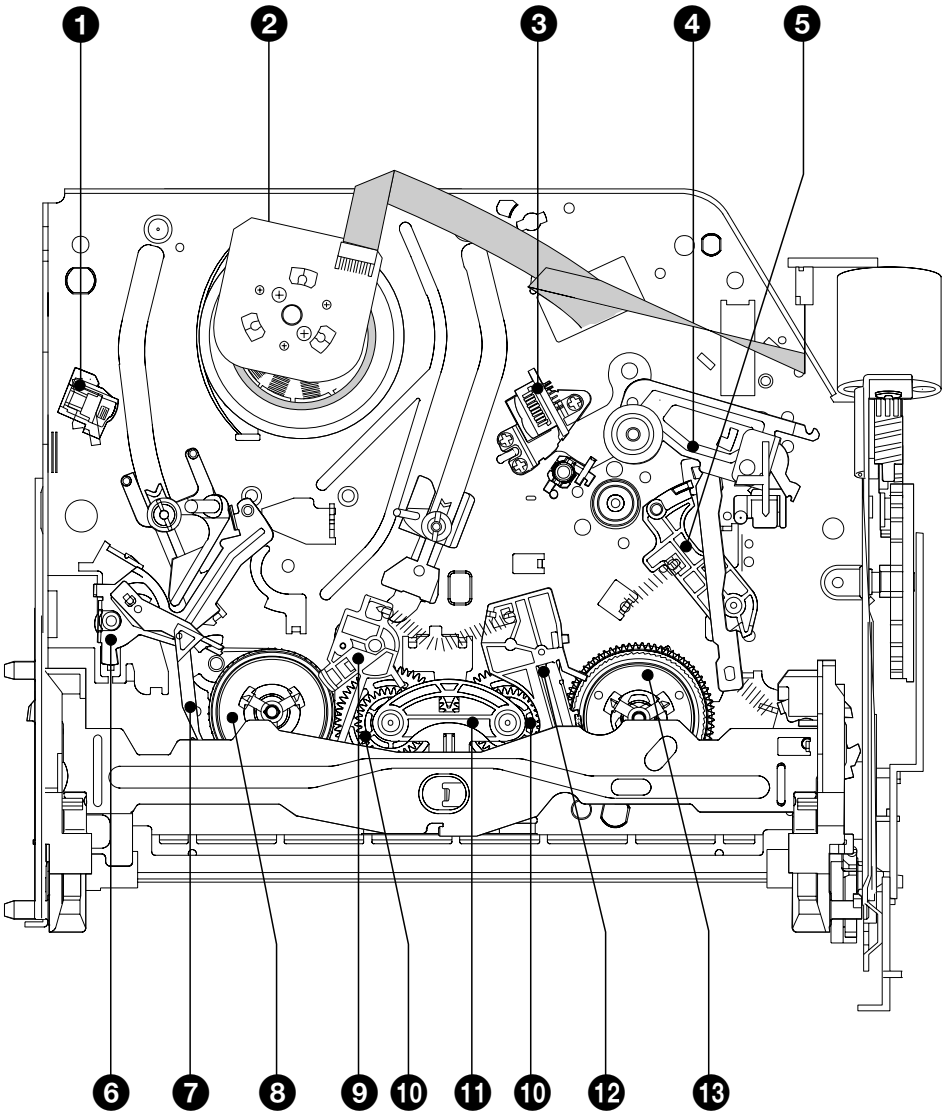


Fig. 2-9 Top Parts Location-2

1. FE HEAD
2. CYLINDER ASS'Y
3. ACE HEAD ASS'Y
4. LEVER UNIT PINCH ASS'Y
5. LEVER #9 GUIDE ASS'Y
6. LEVER TENSION ASS'Y
7. BAND BRAKE ASS'Y
8. DISK S REEL
9. LEVER S BRAKE ASS'Y
10. GEAR IDLE
11. LEVER IDLE
12. LEVER T BRAKE ASS'Y
13. DISK T REEL

2-3-2 Bottom View

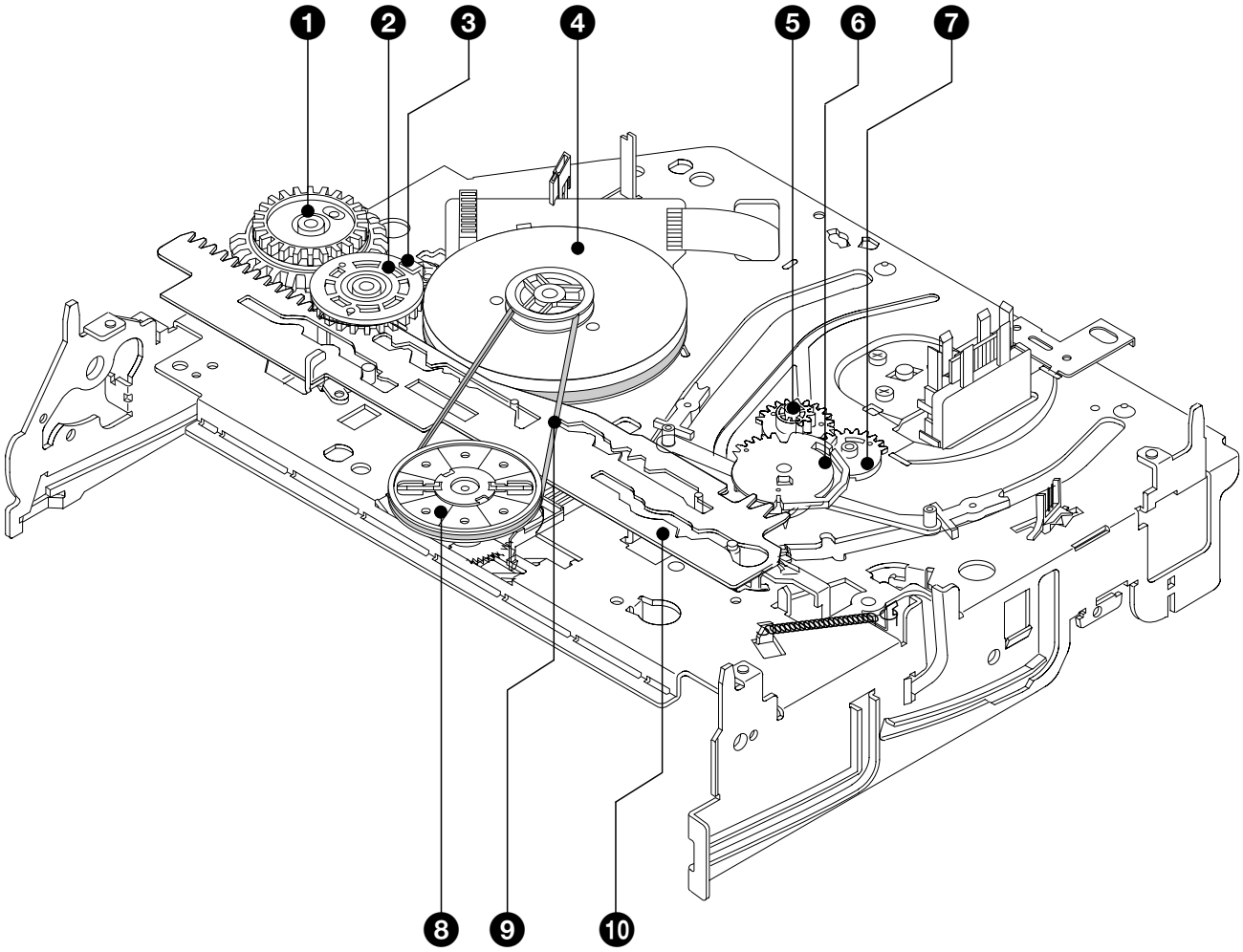


Fig. 2-10 Bottom Parts Location

1. GEAR JOINT 1
2. GEAR JOINT 2
3. BRAKET GEAR
4. MOTOR CAPSTAN ASS'Y
5. LEVER T LOAD ASS'Y
6. GEAR LOADING DRIVE
7. LEVER S LOAD ASS'Y
8. HOLDER CLUTCH ASS'Y
9. BELT PULLEY
10. SLIDER CAM

2-4 VCR DECK

2-4-1 Holder FL Cassette Ass'y Removal

1) Pull the Holder FL Cassette Ass'y ❶ to the eject position.
2) Pull the Holder FL Cassette Ass'y ❶ as grasping the Holder FL Cassette Ass'y ❶ and Lever FL Cassette-R ❷ in the same time to release hooking from Main Base until the Boss [A] of Holder FL Cassette Ass'y ❶ is taken out from the Rail [B].
3) Lift the Holder FL Cassette Ass'y ❶, in this time, you have to grasp the Lever FL Cassette-R ❷ Continuously until the Holder FL Cassette Ass'y ❶ is taken out completely.

Note: Be sure to insert Lever FL Cassette-R ❷ in the direction of "A" to prevent separation and breakage of the Lever FL Cassette-R ❷ at disassembling and reassembling.

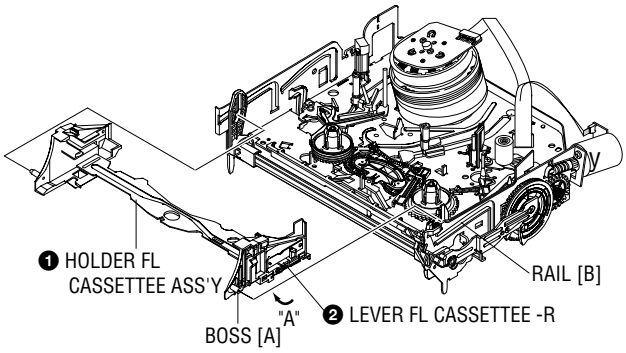


Fig. 2-11 Holder FL Cassette Ass'y Removal

2-4-2 Lever FL Arm Ass'y Removal

1) Push the hole "A" in the direction of arrow "B" use the pin.(about Dia. 2.5)
2) Pull out the Lever FL Arm Ass'y ❶ from the Boss of Main Base.
3) Remove the Lever FL Arm Ass'y ❶ in the direction of arrow "C".

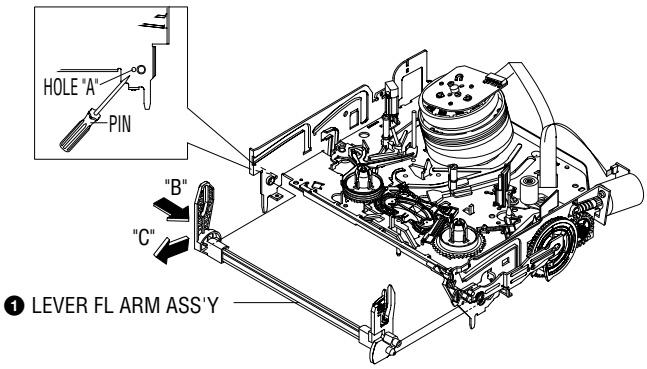


Fig. 2-12 Lever FL Arm Ass'y Removal

2-4-3 Lever FL Door Removal

1) Release the Hook ❷ and Remove the Lever FL Door ❶ in the direction of arrow “A”.

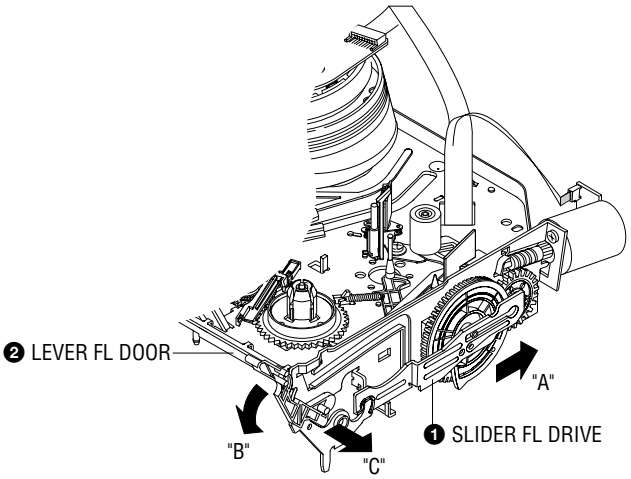


Fig. 2-13 Lever FL Door Removal

2-4-4 Slider FL Drive, Gear FL Cam Removal

1) Pull the Slider FL Drive ❶ to the front direction.
2) Remove the Slider FL Drive ❶ in the direction of arrow. (Refer to Fig. 2-13)
3) Remove the Gear FL cam ❷.

Note: When reinstalling be sure to reassemble Slider FL drive ❶ after you insert the Boss of Lever FL ARM-R in Groove of Slider FL drive ❶.

Assembly: Align the Gear FL Cam ❶ with the Gear worm wheel Post as shown drawing.
(Refer to Timing point)

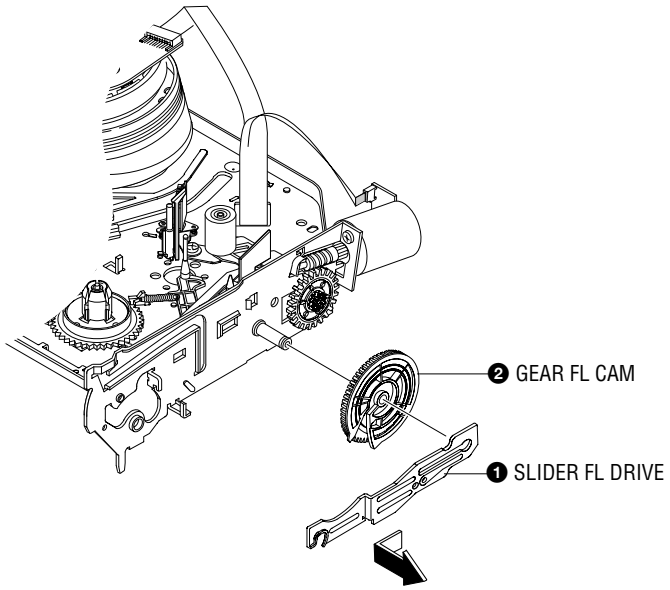


Fig. 2-14 Slider FL Drive Removal

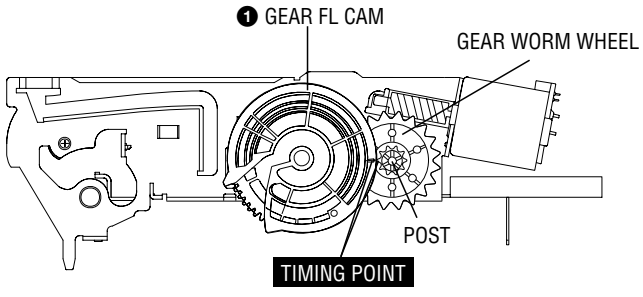


Fig. 2-15 Gear FL Cam, Gear Worm

2-4-5 Gear Worm Wheel Removal

1) Remove the Gear Worm wheel ❶.

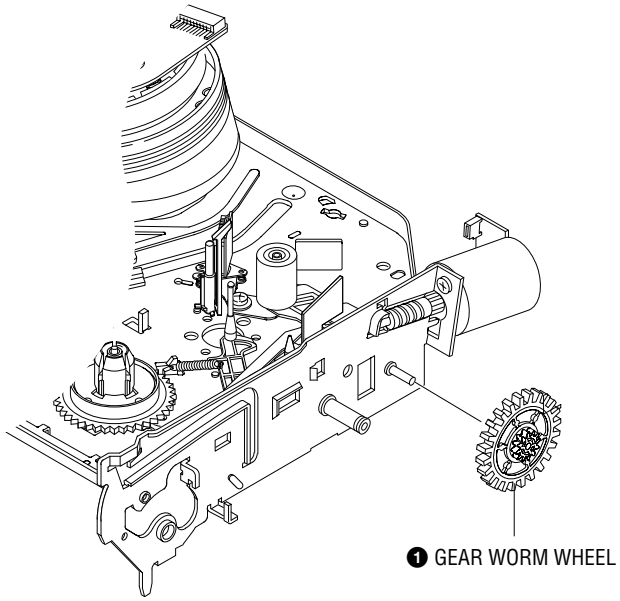


Fig. 2-16 Gear Worm Wheel Removal

2-4-6 Cable Flat Removal

1) Remove the Drum connecting part of Cable Flat ❶ from Connector Wafer ❷.
2) Remove the Loading Motor connecting part of Cable Flat ❶ from Connector Wafer ❸.

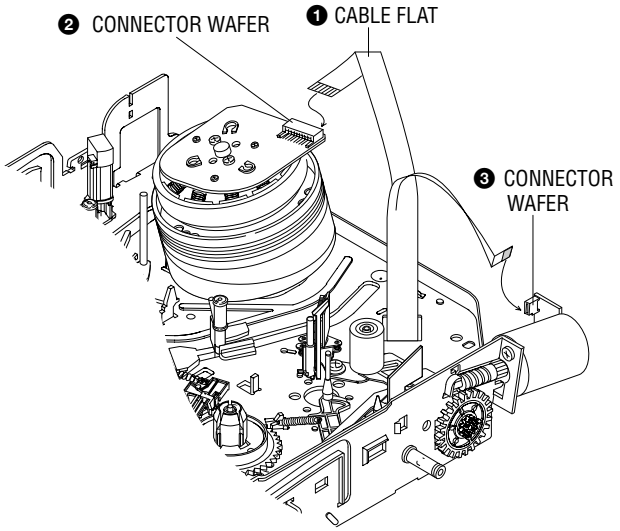


Fig. 2-17 Cable Flat Removal

2-4-7 Motor Loading Ass'y Removal

1) Remove the Screw ❶.
2) Remove the Motor Loading Ass'y ❷.

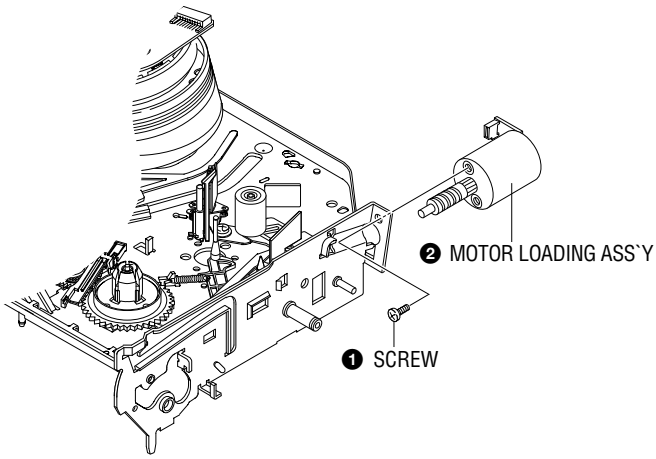


Fig.2-18 Motor Loading Ass'y Removal

2-4-8 Bracket Gear, Gear Joint 2, 1 Removal

1) Remove the Screw ❶.
2) Remove the Bracket Gear ❷.
3) Remove the Gear Joint 2 ❸.
4) Remove the Gear Joint 1 ❹.

Assembly:

1) Be sure to align dot mark of Gear Joint 1 ❶ with dot mark of Gear Joint 2 ❷ as shown Fig 2-20.
   (Refer to Timing point1)
2) Confirm the Timing Point 2 of the Gear Joint 2 ❷ and Slider Cam ❸.

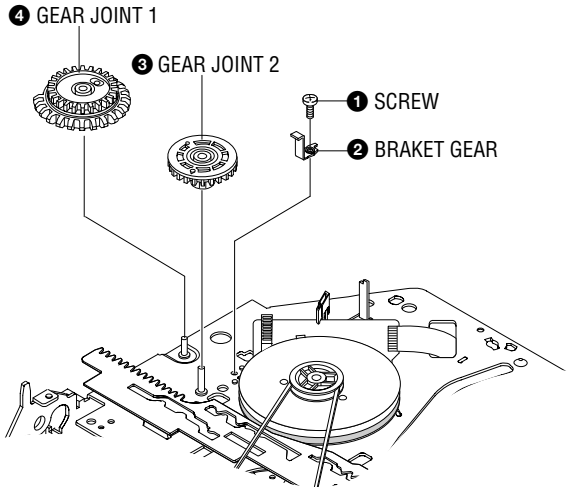


Fig. 2-19 Bracket Gear, Gear Joint 1,2 Removal

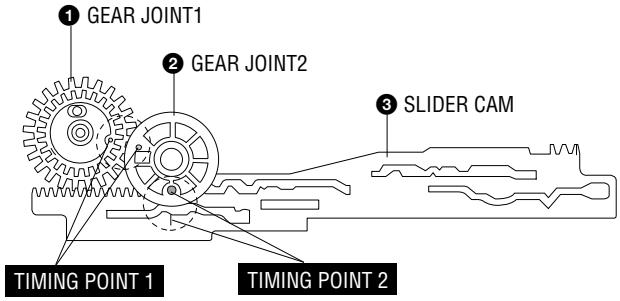


Fig. 2-20 Gear Joint 1,2 Assembly

2-4-9 Gear Loading Drive, Slider Cam, Lever Load S, T Ass'y Removal

1) Remove the Belt Pulley. (Refer to Fig. 2-38)
2) Remove the Gear Loading Drive ❶ after releasing Hook [A] in the direction arrow as shown in detail drawing.
3) Remove the Slider Cam ❷.
4) Remove the Lever Load S Ass'y ❸ & Lever Load T Ass'y ❹.

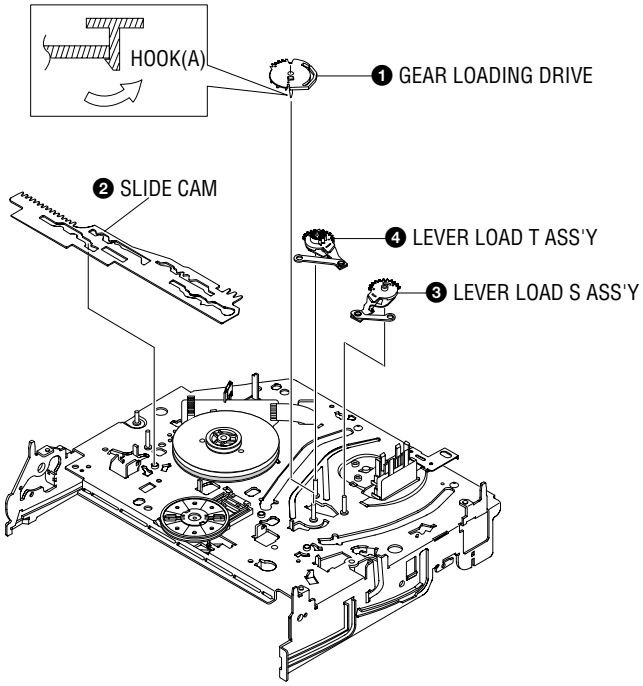


Fig. 2-21 Gear Loading Drive, Slider Cam, Lever T, S Load Ass'y Removal

2-4-10 Gear Loading Drive, Slider Cam, Lever Load S, T Ass'y Assembly

1) When reinstalling, be sure to align dot of Lever Load T Ass'y ❶ with dot of Lever Load S Ass'y ❷ as shown in drawing, (Refer to Timing Point 1).
2) Insert the Pin A,B,C,D into the Slider Cam ❸ hole.
3) Be sure to align dot of Lever Load T ❶ and dot of Gear Loading Drive ❹, (Refer to Timing Point 2).
4) Aline dot of Gear Loading drive ❹ with mark of Slider Cam ❸ as shown in drawing (Refer to Timing Point 3).

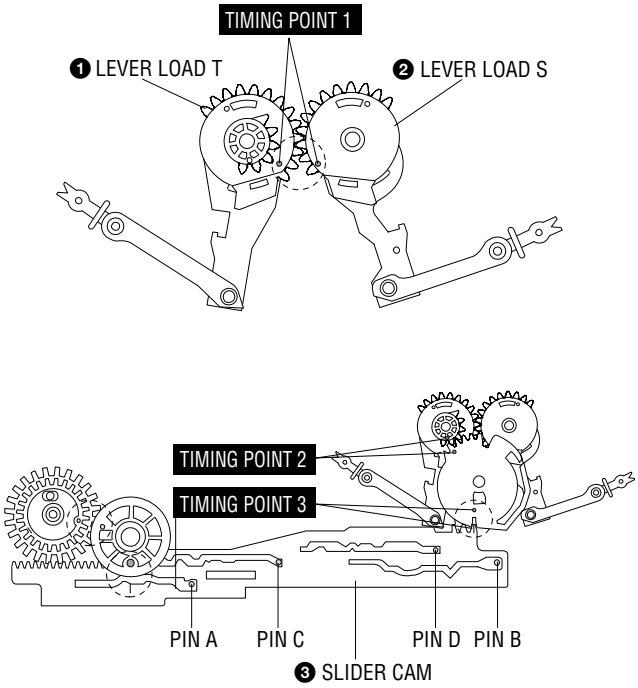


Fig. 2-22 Gear Loading Drive, Slider Cam, Lever Load S, T Ass'y Assembly

2-4-11 Lever Pinch Drive, Lever Tension Drive Removal

1) Remove the Lever Pinch Drive ❶, Lever Tension Drive ❷.

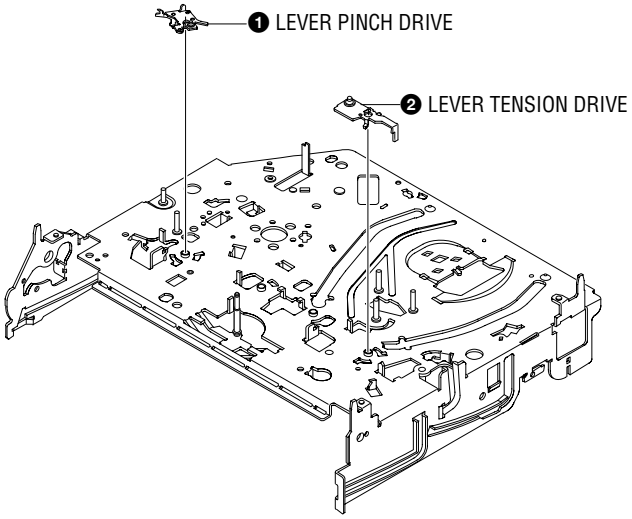


Fig. 2-23 Lever Pinch Drive, Lever Tension Drive Removal

2-4-12 Lever Tension Ass'y, Band Brake Ass'y Removal

1) Remove the Lever Brake S Ass'y (Refer to Fig 2-25).
2) Remove the Spring Tension Lever ❶.
3) Rotate stopper of Main Base in the direction of arrow "A".
4) Lift the Lever Tension Ass'y ❷ & Band Brake Ass'y ❸.

Note:

1) When replacing the Lever Tension Ass'y ❷, be sure to apply Grease on the post.
2) Take care not to touch stain on the felt side, and not to be folder and broken Band Brake Ass'y
3) After Lever Tension Ass'y seated, Rotate stopper of Main Base to the Mark[B].

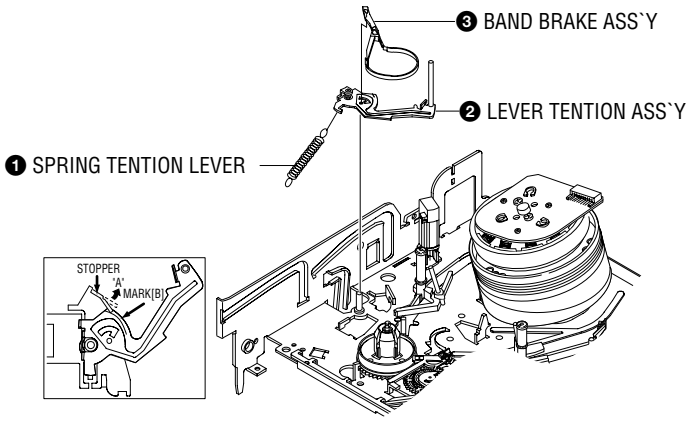


Fig. 2-24 Lever Tension Ass'y, Band Brake Ass'y Removal

2-4-13 Lever Brake S, T Ass'y Removal

1) Release the Hook [A] and the Hook [B], [C] in the direction of arrow as shown in Fig 2-25.
2) Lift the Lever S, T Brake Ass'y ❶, ❷ with spring brake ❸.

Assembly:

1) Assembly the Lever S Brake Ass'y ❶ on the Main Base.
2) Assembly the Lever T Brake Ass'y ❷ with spring brake ❸.

Note: Take extreme care not to be folded and transformed Spring Brake at removing or reinstalling.

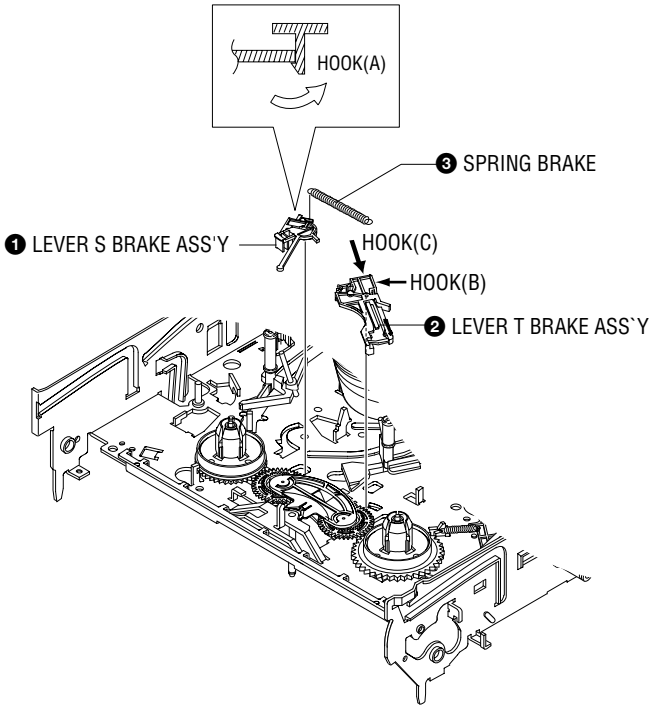


Fig. 2-25 Lever Brake S, T Ass'y Removal

2-4-14 Gear Idle Ass'y Removal

1) Push the Lever Idle ❶ in the direction of arrow "A", "B".
2) Lift the Lever Idle ❶.

Assembly:

1) Apply oil in two Bosses of Lever Idle ❶.
2) Assemble the Gear Idle ❷ with the Lever Idle ❶.

Note: When replacing the Gear Idle ❷, be sure to add oil in the boss of Lever Idle ❶.

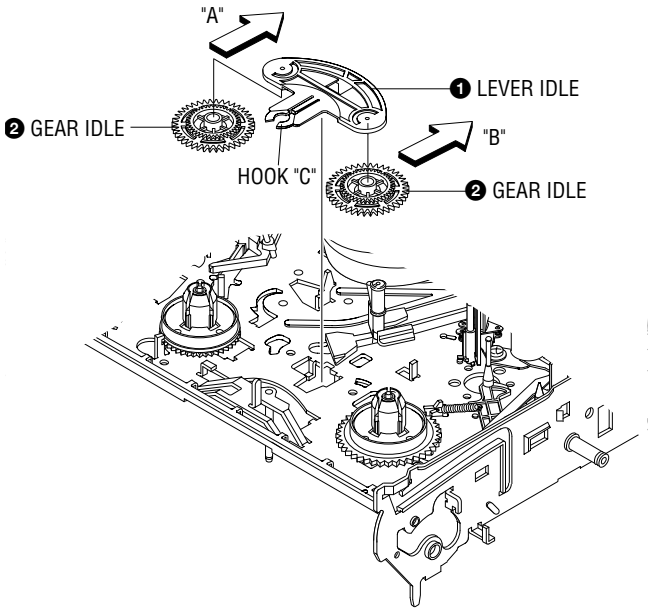


Fig. 2-26 Gear Idle Ass'y Removal

2-4-15 Disk S, T Reel Removal

1) Lift the Disk S, T Reel ❶, ❷.

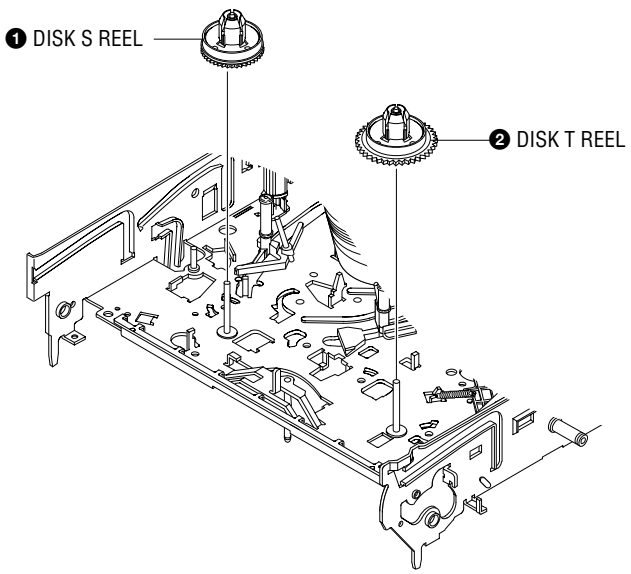
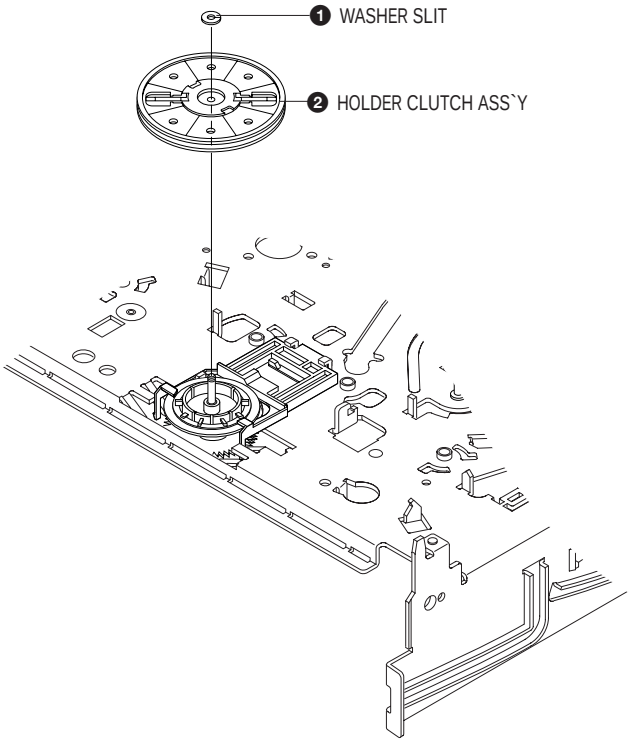


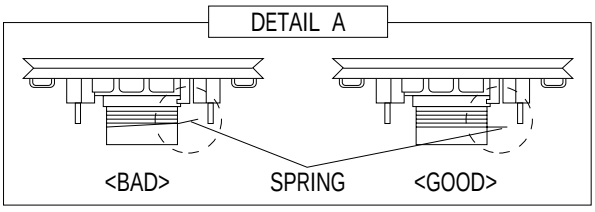
Fig. 2-27 Disk S, T Reel Removal

2-4-16 Holder Clutch Ass'y Removal

1) Remove the Washer Slit ❶.
2) Lift the Holder Clutch Ass'y ❷.

Note: When you reinstall Holder Clutch Ass'y
1) Check the condition of spring as shown in detail A.
2) Don't push Holder Clutch Ass'y down with excessive force Just insert Holder Clutch Ass'y into post center with dead force and Rotate it smoothly.
   Be sure to confirm that spring is in the slit of Gear Center Ass'y as shown in detail B.





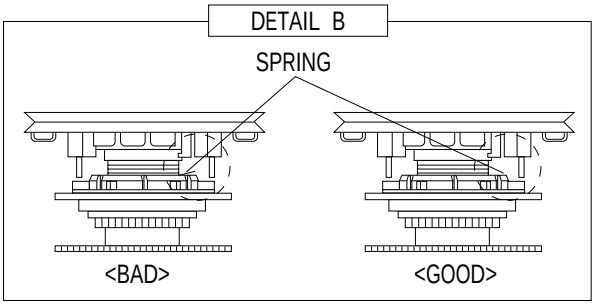


Fig. 2-28 Holder Clutch Ass'y Removal

2-4-17 Lever Up Down Ass'y, Gear Center Ass'y Removal

1) Remove the 2 hooks in the direction of arrow as shown Fig. 2-29 and lift the Lever Up Down Ass'y ❶.
2) Lift the Gear Center Ass'y ❷.

Assembly:

1) Insert the Lever Up Down Ass'y ❶ in the rectangular holes on Main Base as shown in Fig 2-30.
2) Lift the Lever Up Down Ass'y ❶ about 35°.
   (Refer to Fig 2-30)
3) Insert Ring of the Gear Center Ass'y ❷ in the Guide of the Lever Up Down Ass'y ❶.
4) Insert the Gear Center Ass'y ❷ in the post on Main Base.
5) Push down the Lever Up Down Ass'y ❶ for locking of the Hook.

Note:

1) Take care not to separate and sentence does not mark sense.
2) Be sure to confirm that Ring of the Gear Center Ass'y ❷ is in the Guide of the Lever Up Down Ass'y ❶ after finishing assembly of Lever Up Down Ass'y ❶ and Gear Center Ass'y ❷.

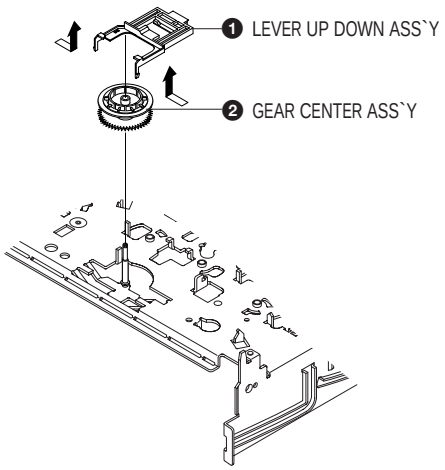


Fig. 2-29 Lever Up Down Ass'y Removal

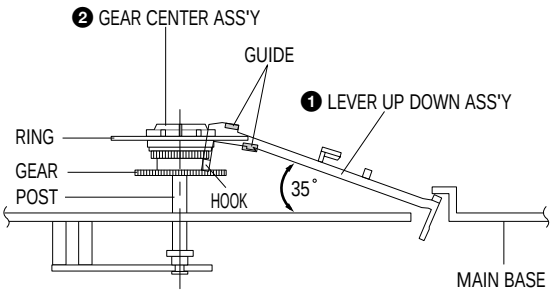


Fig. 2-30 Lever Up Down Ass'y Assembly

2-4-18 Guide Cassette Door Removal

1) Lift the Hook [A].
2) Rotate the Guide Cassette Door ❶ in the direction of arrow.

Note: After reinstalling the Guide Cassette Door ❶ sure the Hook [A].

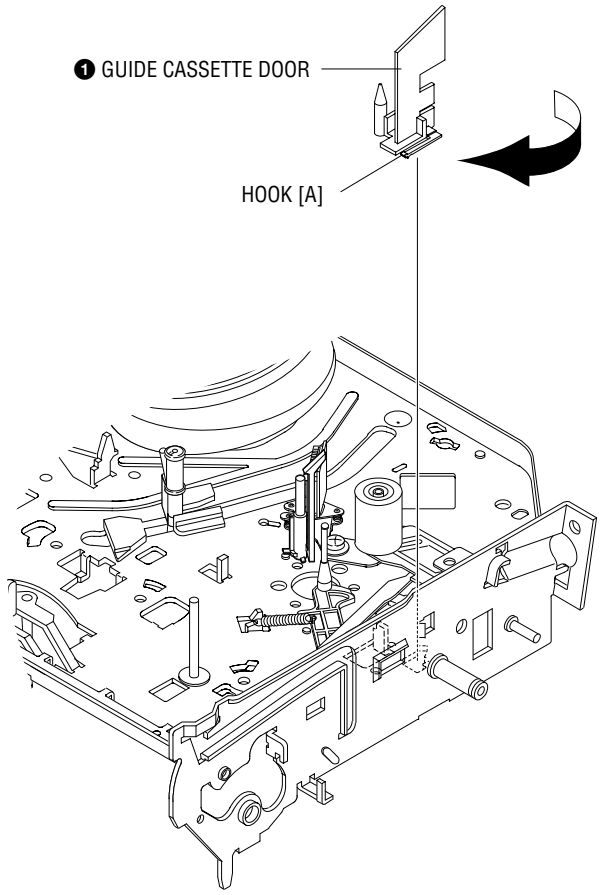


Fig. 2-31 Guide Cassette Door Removal

2-4-19 Lever Unit Pinch Ass'y, Plate Joint, Spring Pinch Drive Removal

1) Lift the Lever Unit Pinch Ass'y ❶.
2) Remove the Plate Joint ❷ from Lever Pinch Drive.
3) Remove the Spring Pinch Drive ❸.

Note:
1) Take extreme care not to touch the grease on the Roller Pinch.
2) When reinstalling, be sure to apply grease on the post pinch roller.

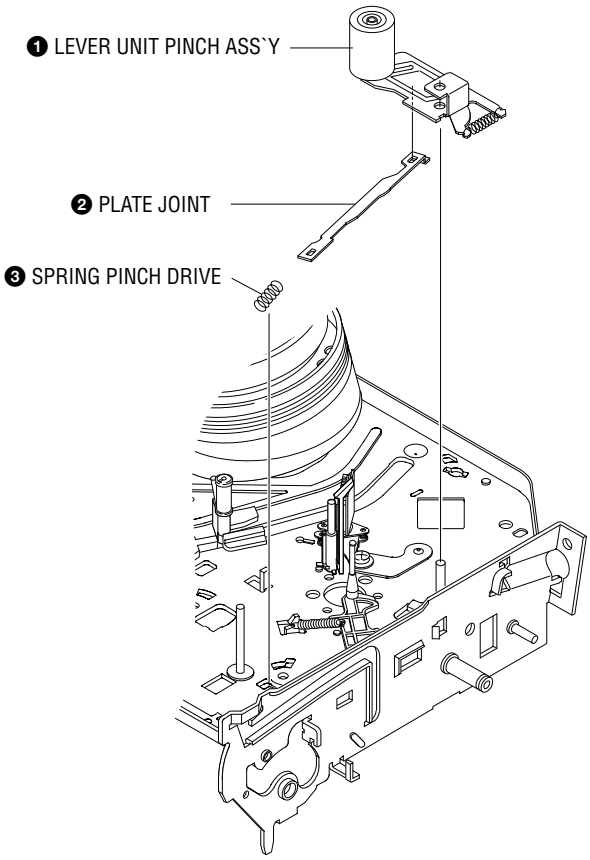


Fig. 2-32 Lever Unit Pinch Ass'y, Plate Joint, Spring Pinch Drive Removal

2-4-20 Lever #9 Guide Ass'y Removal

1) Remove the Spring #9 Guide ❶.
2) Lift the Lever #9 Guide Ass'y ❷ in the direction of arrow "A".

Note:
1) Take extreme care not to get grease on the tape Guide Post.
2) After reinstalling, check the bottom side of the Post #9 Guide to the top side of Main Base.

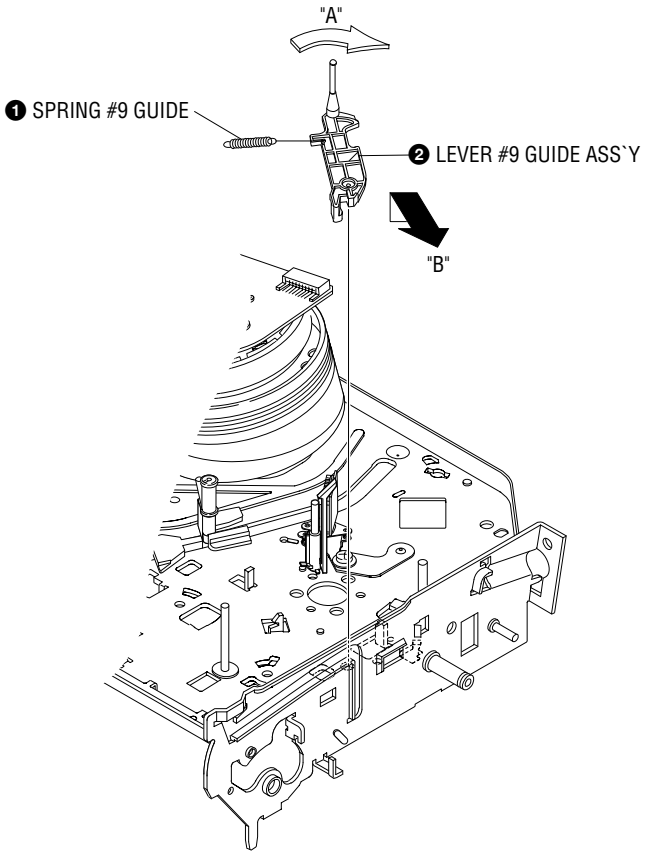


Fig. 2-33 Lever #9 Guide Ass'y Removal

2-4-21 FE Head Removal

1) Lift the FE Head ❶.

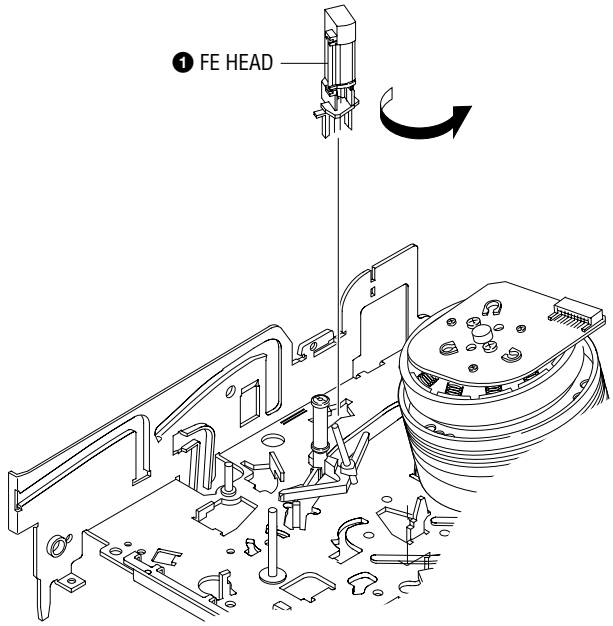


Fig. 2-34 FE Head Removal

2-4-22 ACE Head Removal

1) Pull out the FPC from connector of ACE Head Ass'y ❷.
2) Remove the Screw ❶.
3) Lift the ACE Head Ass'y ❷.

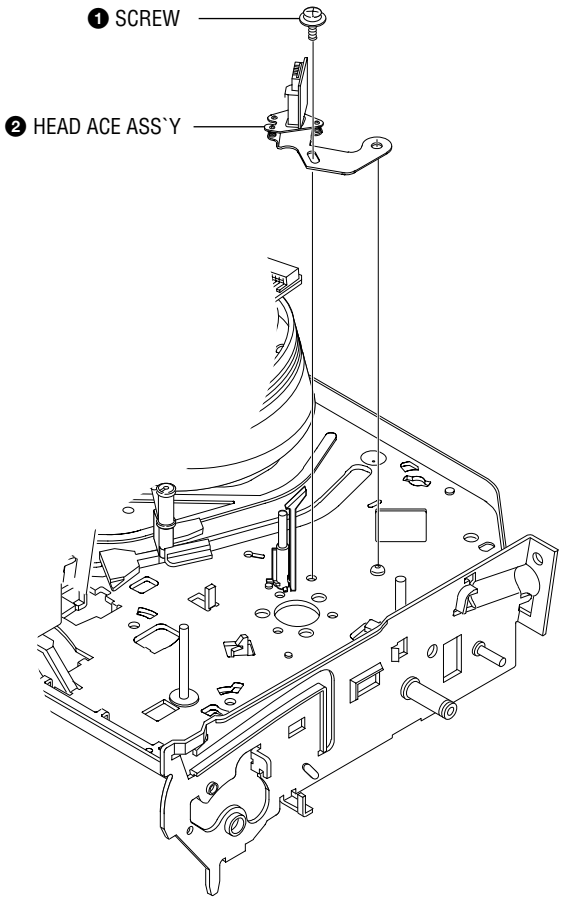


Fig. 2-35 ACE Head Removal

2-4-23 Slider S, T Ass'y Removal

1) Move the Slider S, T Ass'y ❶, ❷ to slot, and then lift it to remove. (Refer to arrow)

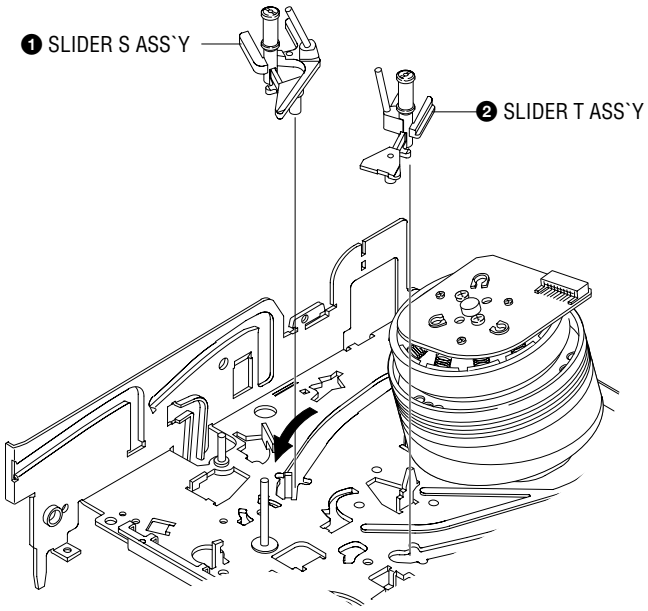


Fig. 2-36 Slider S, T Ass'y Removal

2-4-24 Plate Ground Deck, Cylinder Ass'y Removal

1) Remove the 3 Screws ❶.
2) Lift the Plate Ground Deck ❷.
3) Lift the Cylinder Ass'y ❸.

Assembly:

1) Match the 3 holes in the bottom of Cylinder Ass'y ❸ to the 3 holes of Main Base as attending not to drop or knock the Cylinder Ass'y ❸.
2) Tighten the 1 Screw ❶.
3) Match the Plate Ground Deck ❷ to the Hole of Base Main.
4) Tighten the other 2 Screws ❶.

Note:

1) Take care not to touch the Cylinder Ass'y ❸ and the tape guide post at reinstalling.
2) When reinstalling, Don't push down too much on Screw Driver.

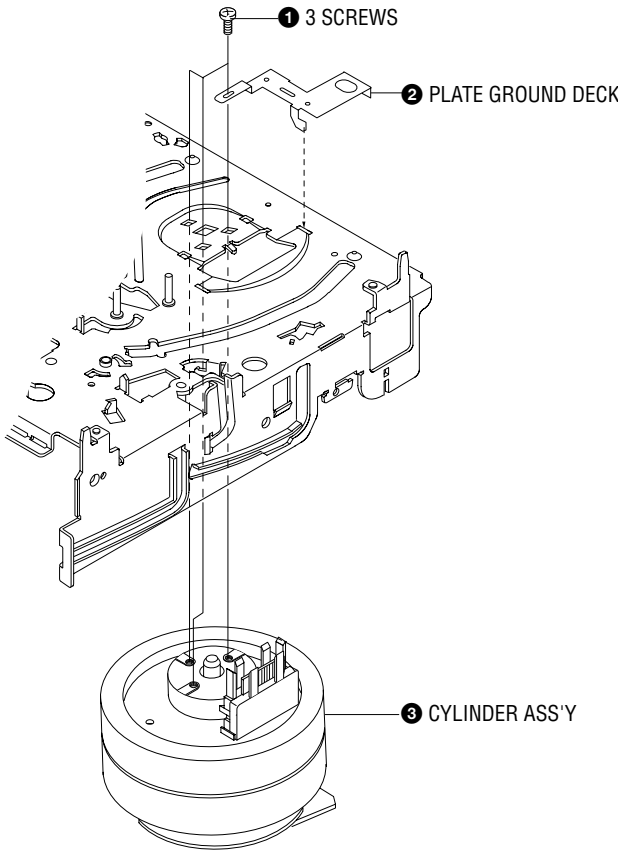


Fig. 2-37 Plate Ground Deck, Cylinder Ass'y Removal

2-4-25 Hook Capstan, Belt Pulley Removal

1) Remove the Hook Capstan ❶ after realeasing Hook in the direction arrow as shown in detail drawing.
2) Remove the Belt Pulley ❷.

Note: Take extreme care not to get grease on Belt Pulley ❷ at assembling or reassembling.

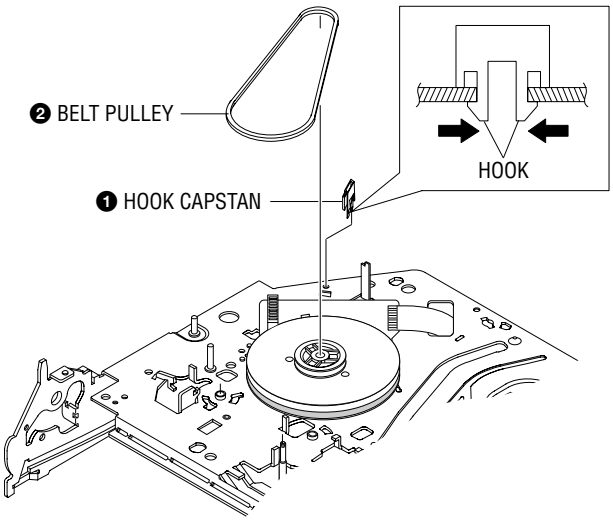


Fig. 2-38 Hook Capstan, Belt Pulley Removal

2-4-26 Motor Capstan Ass'y Removal

1) Remove the 3 Screws ❶.
2) Remove the Motor Capstan Ass'y ❷.

Assembly:
1) Match the 3 holes of Motor Capstan Ass'y ❷ to the 3 holes of Main Base. Be careful not to drop or knock the Motor Capstan Ass'y ❷.
2) Tighten the 3 Screws ❶ in the direction of arrow as shown detail drawing.

Note: After tightening screws, check if there is gap between the head of screws and the top side of Main Base. There should have no gap between the head of screws and the top side of Main Base. After reinstalling, adjusting the tape transport system again.

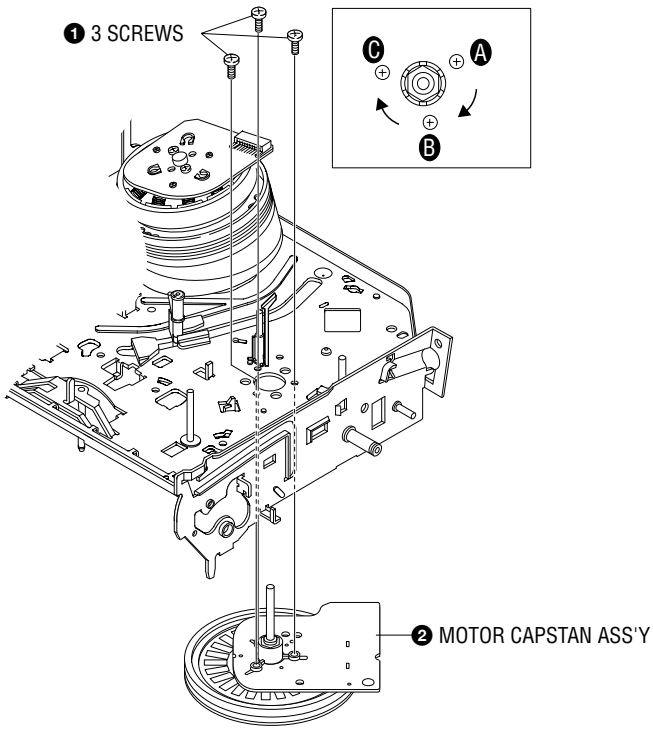


Fig. 2-39 Motor Capstan Ass'y Removal

2-4-27 Post #8 Guide Ass'y Removal

1) Rotate the Post #8 Guide Ass'y ❶ in the direction of arrow to lift up.

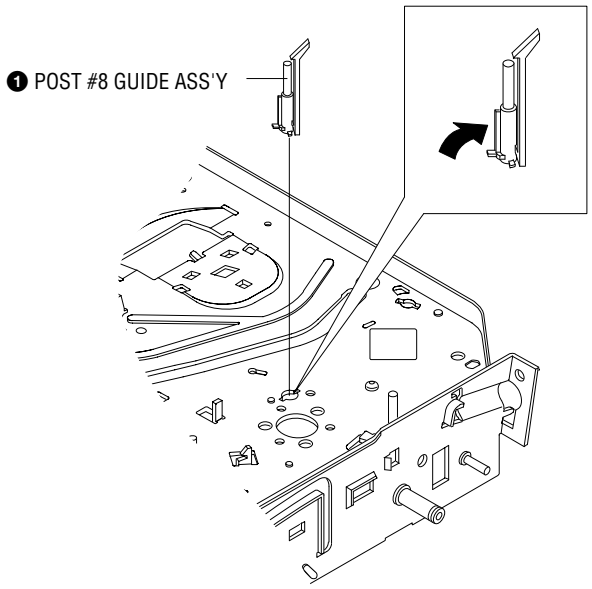


Fig. 2-40 Post #8 Guide Ass'y Removal

2-4-28 Lever Head Cleaner Ass'y Removal

1) Release the Hook ❶.
2) Lift the Lever Head Cleaner Ass'y ❷.

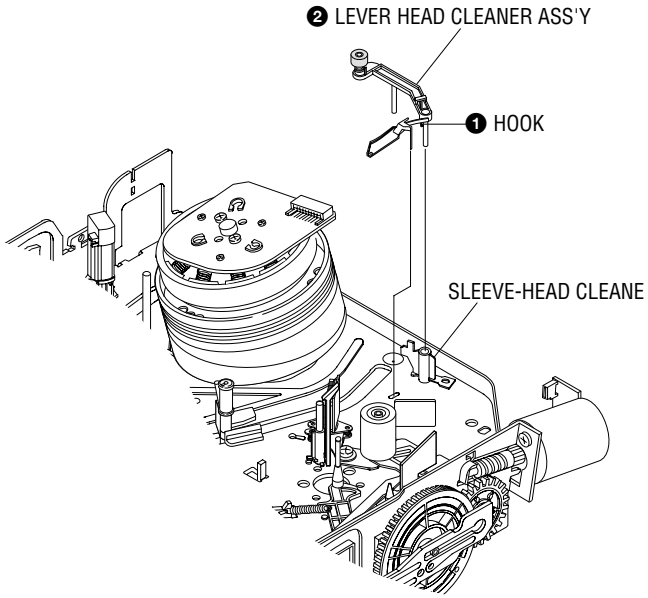


Fig. 2-41 Lever Head Cleaner Ass'y Removal

2-4-29 How to Eject the Cassette Tape (If the unit does not operate on condition that is inserted into housing ass'y)

1) Turn the Gear worm ❶ clockwise with screw driver.(Refer to arrow)
   (Other method: Remove the Screw of Motor Load Ass'y, Separate the Motor Load Ass'y)

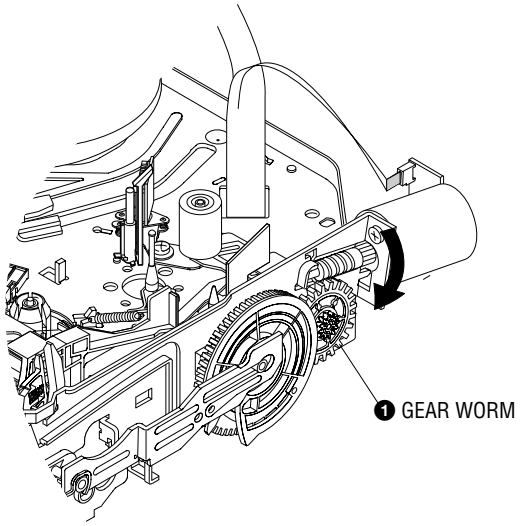


Fig. 2-42

2) When Slider S,T are approched in the position of unloading, rotate holder Clutch counterclockwise after inserting screw driver in the hole of frame's bottom in order to wind the unwinded tape.
   (Refer to Fig.2-43)
   (If you rotate Gear Worm ❶ continuously when tape is in state of unwinding, you may cause a tape contamination by grease and tape damage.
   Be sure to wind the unwinded tape in the state of set horizontly.)
3) Rotate Gear Worm ❶ clockwise using screw driver again up to the state of eject mode and then pick out the tape.(Refer to Fig.2-42)

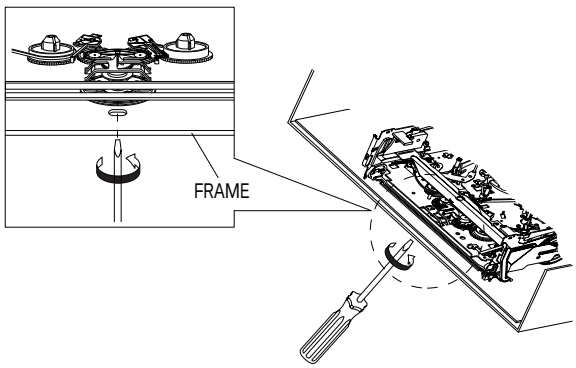


Fig. 2-43

2-5 THE TABLE OF CLEANING, LUBRICATION AND REPLACEMENT TIME ABOUT PRINCIPAL PARTS

1) The replacement time of parts is not life of parts.
2) The table 2-1 is that the VCR Set is in normal condition (normal temperature, normal humidity).
   The checking period may be changed owing to the condition of use, runtime and environmental conditions.
3) Life of the Cylinder Ass'y is depend on the condition of use.
4) See exploded view for location of each parts.

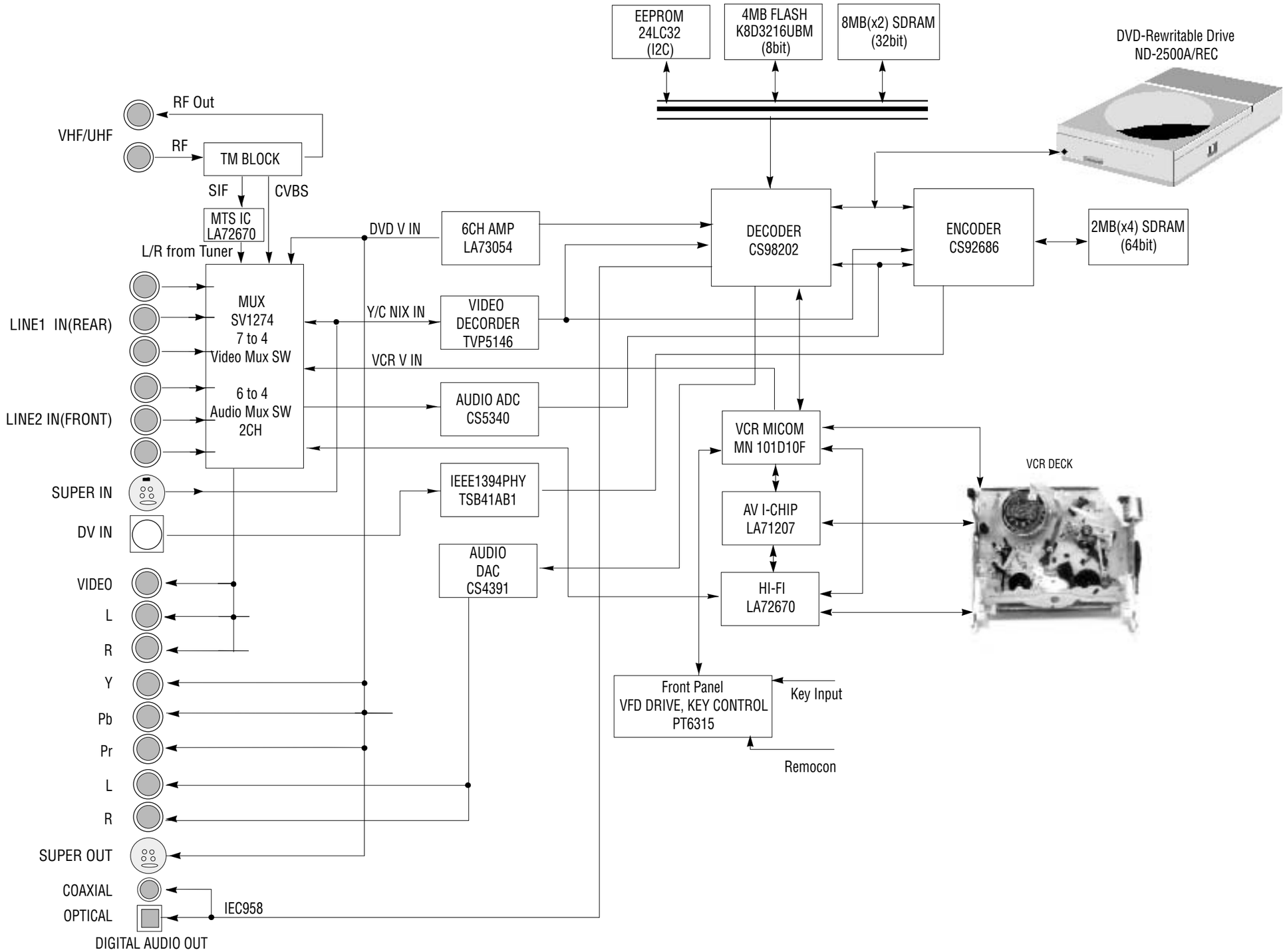
<Table 2-1>

*	Parts Name	Checking Period										Remark
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
TAPE PATH SYSTEM	POST TENSION	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	- To clean the parts, use patch and alcohol (solvent). - After cleaning, use the video tape after alcohol is gone away completely - We recommend to use oil [EP-50] or solvent. - One or two drops of oil should be applied after cleaning with alcohol.
	SLANT POST S, T	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	#8 GUIDE SHAFT	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	CAPSTAN SHAFT	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	#9 GUIDE POST	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	#3 GUIDE POST	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	GUIDE ROLLER S, T	Δ	Δ	Δ	O	O	O	O	O	O	O	
	CYLINDER ASS'Y	Δ	O	O	O	O	O	O	O	O	O	
	FE HEAD	Δ	Δ	Δ	O	O	O	O	O	O	O	
	ACE HEAD	Δ	O	O	O	O	O	O	O	O	O	
	PINCH ROLLER	Δ	O	O	O	O	O	O	O	O	O	
	POST REEL S, T		◆		◆		◆		◆		◆	- Periodic time of applying oil (Apply oil after cleaning) - The excessive applying oil may be the cause of malfunction.
	SLEEVE TENSION		◆		◆		◆		◆		◆	
	POST CENTER		◆		◆		◆		◆		◆	
	LEVER IDLE BOSS (2Point)		◆		◆		◆		◆		◆	
DRIVING SYSTEM	CAPSTAN MOTOR PULLEY	Δ	Δ	Δ	Δ	Δ	O	O	O	O	O	
	BELT PULLEY				O	O	O	O	O	O	O	
	HOLDER CLUTCH ASS'Y	Δ	O	O	O	O	O	O	O	O	O	
	GEAR CENTER ASS'Y		O	O	O	O	O	O	O	O	O	
	GEAR IDLE (2Point)		O	O	O	O	O	O	O	O	O	
	LOADING MOTOR		O	O	O	O	O	O	O	O	O	
BRAKE SYSTEM	BAND BRAKE ASS'Y		O	O	O	O	O	O	O	O	O	
	BRAKE T ASS'Y		O	O	O	O	O	O	O	O	O	

Δ : Cleaning O : Check and replacement in necessary ◆ : Add Oil

MEMO

3. Block Diagram



MEMO

4. PCB Diagrams

4-1 VCR Main PCB ---------- 4-3

4-2 DVD Main PCB ---------- 4-7

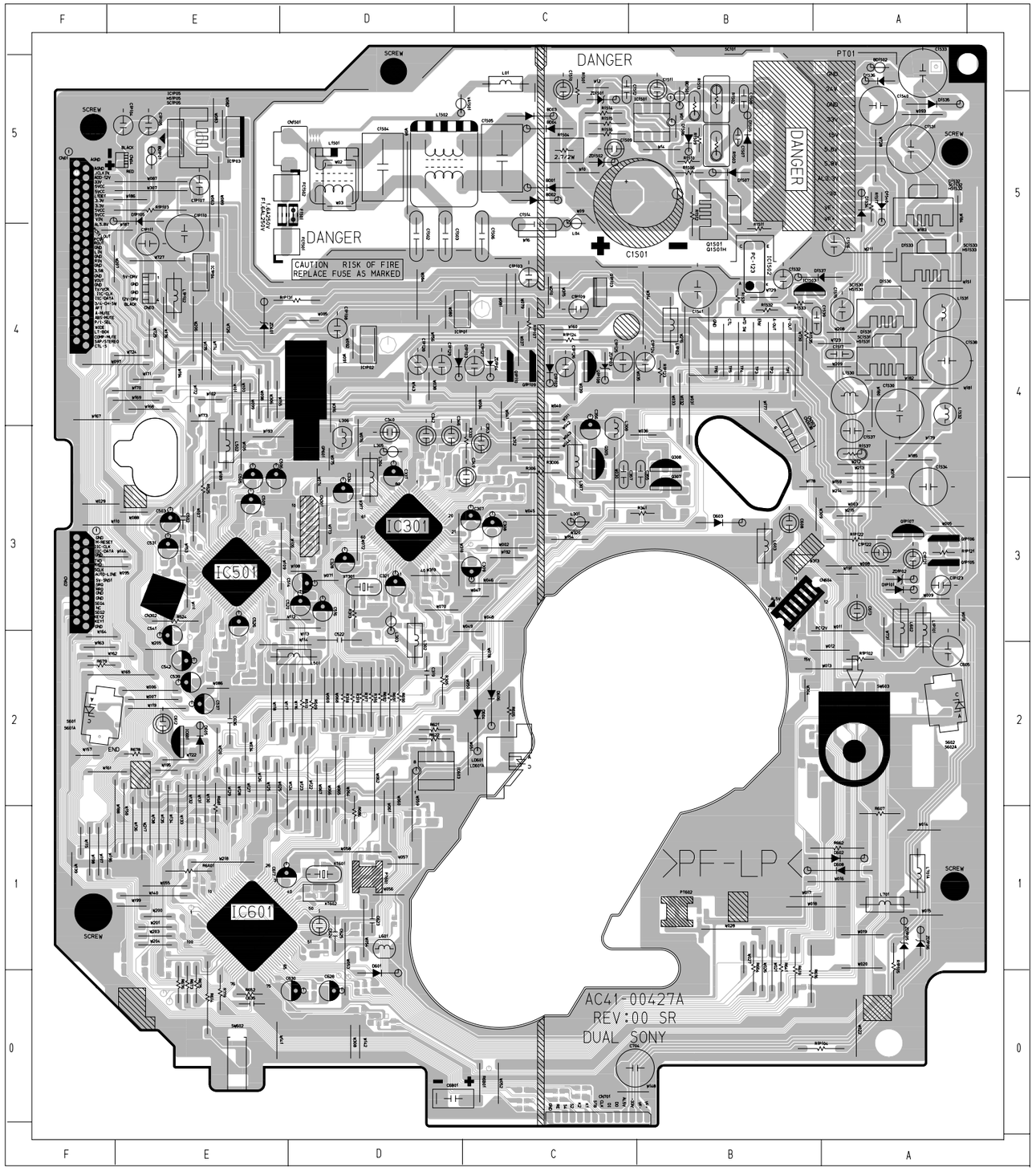
4-3 Jack PCB ---------- 4-11

4-4 DV Input PCB ---------- 4-15

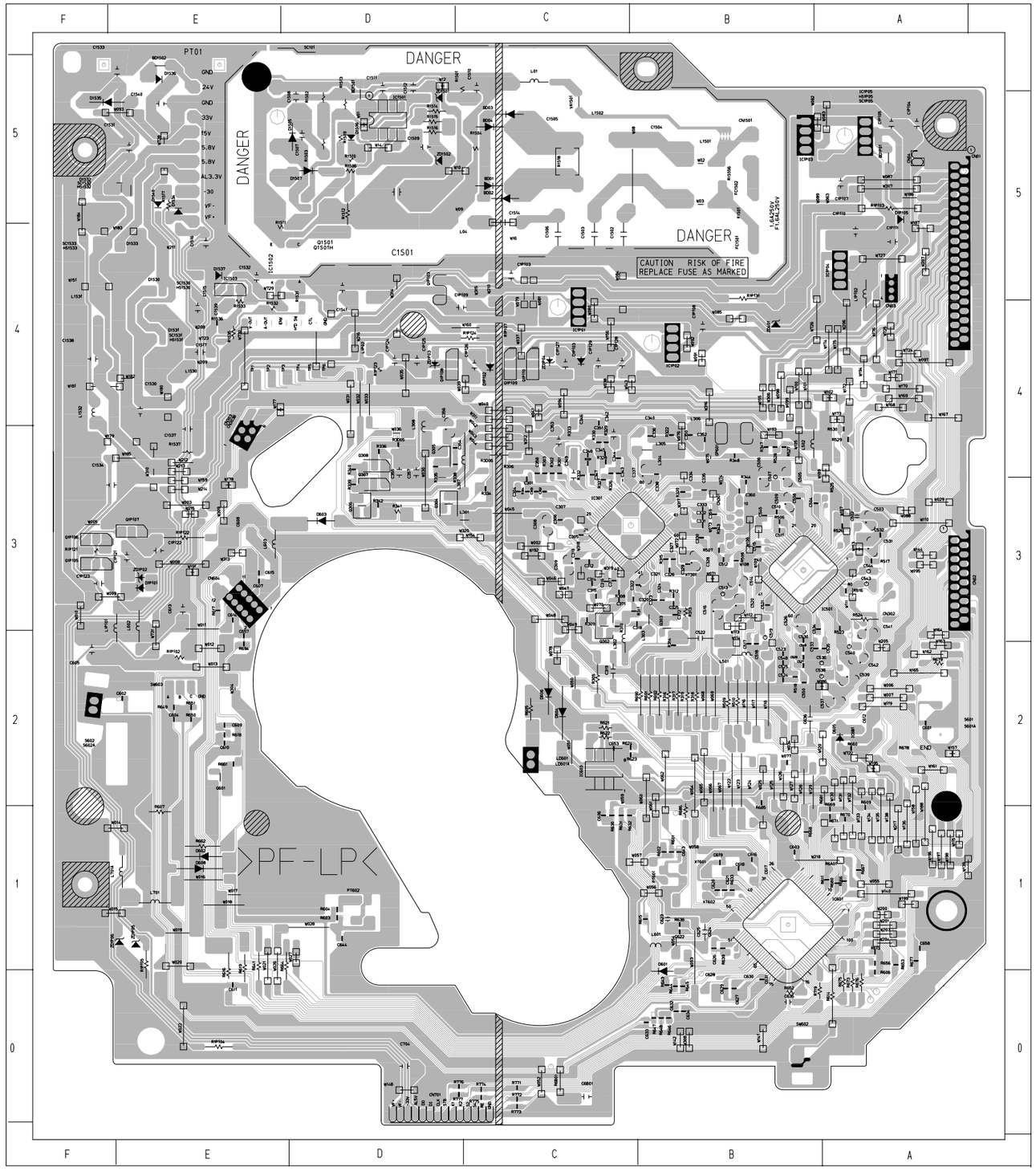
4-5 Function Timer PCB ---------- 4-15

4-1 VCR Main PCB

COMPONENT SIDE

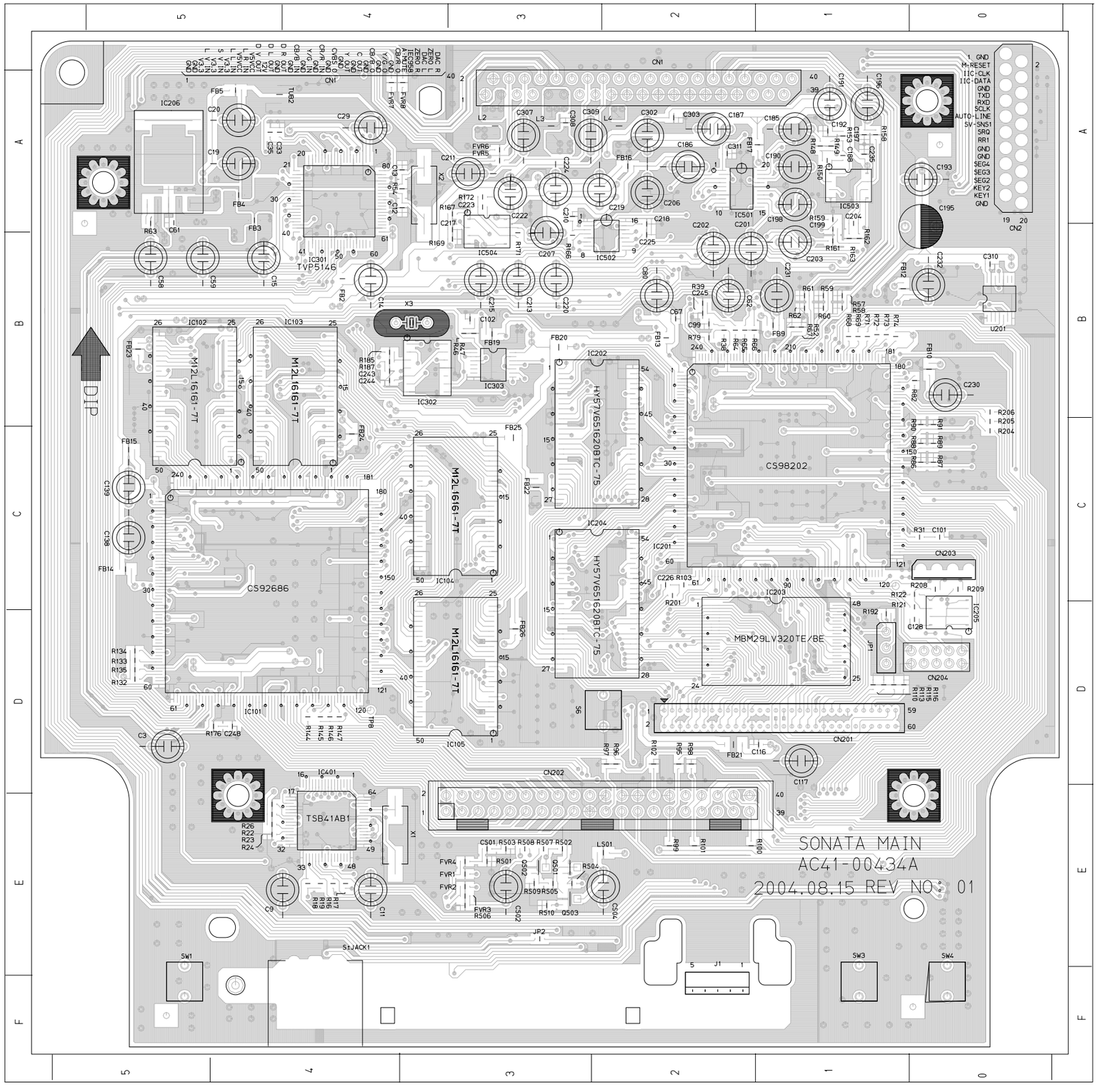


CONDUCTOR SIDE

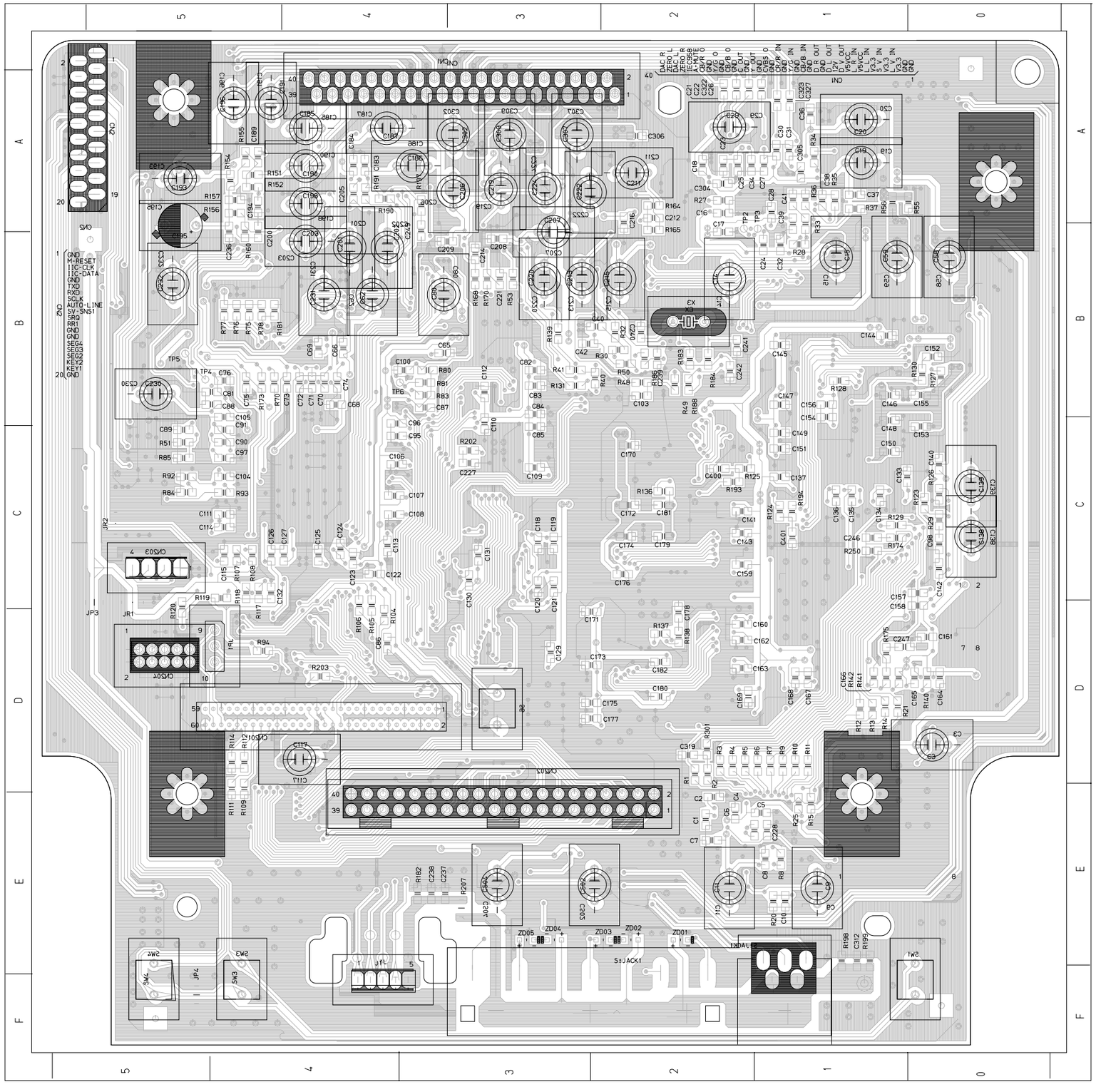


4-2 DVD Main PCB

COMPONENT SIDE

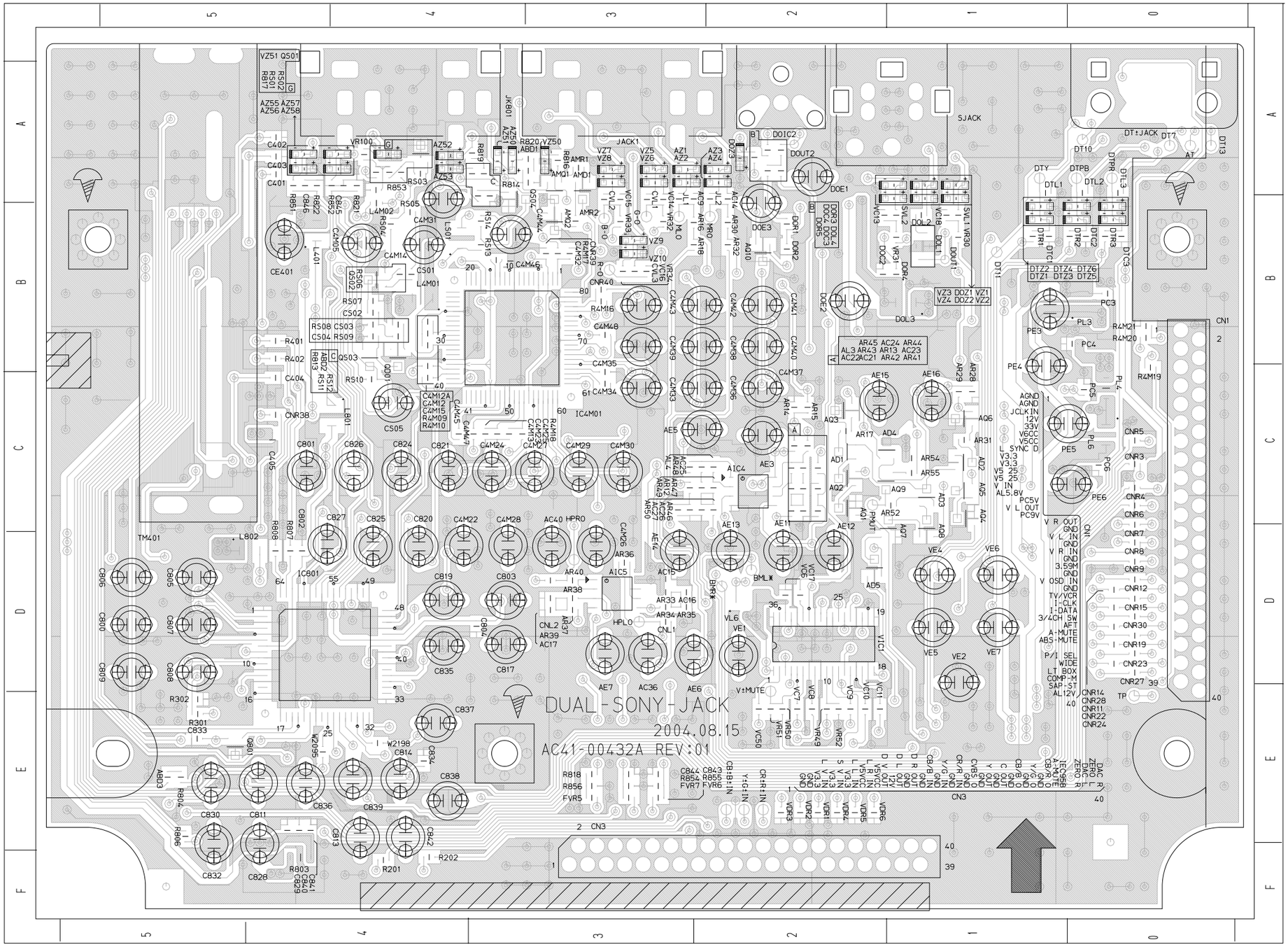


CONDUCTOR SIDE

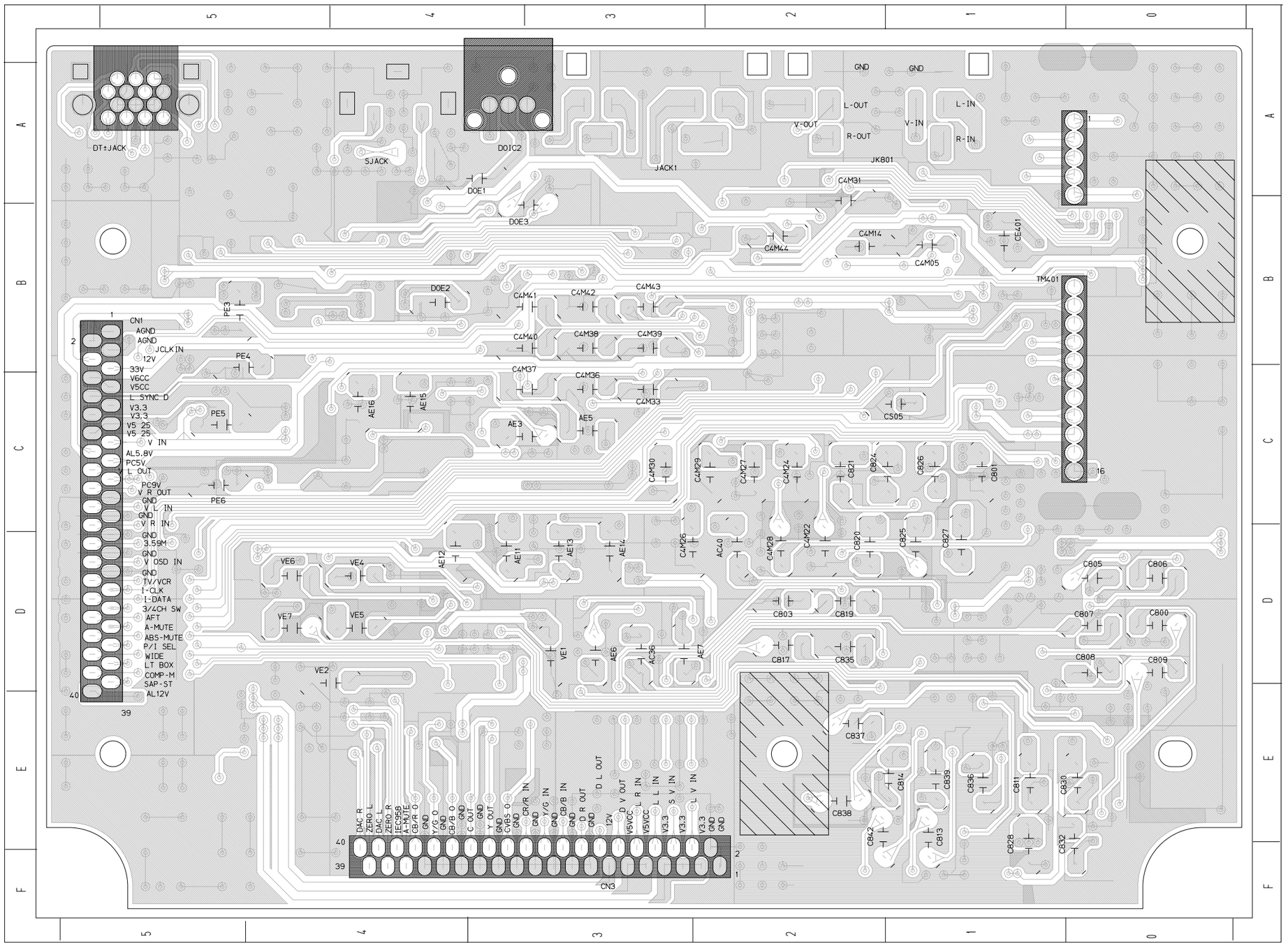


4-3 Jack PCB

COMPONENT SIDE

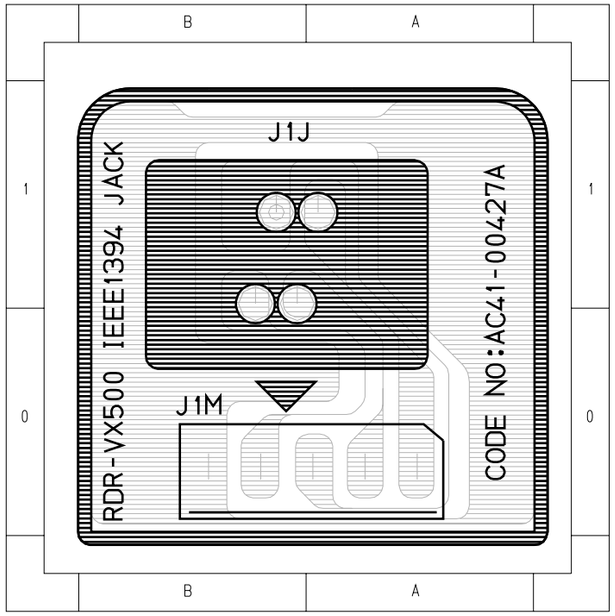


CONDUCTOR SIDE

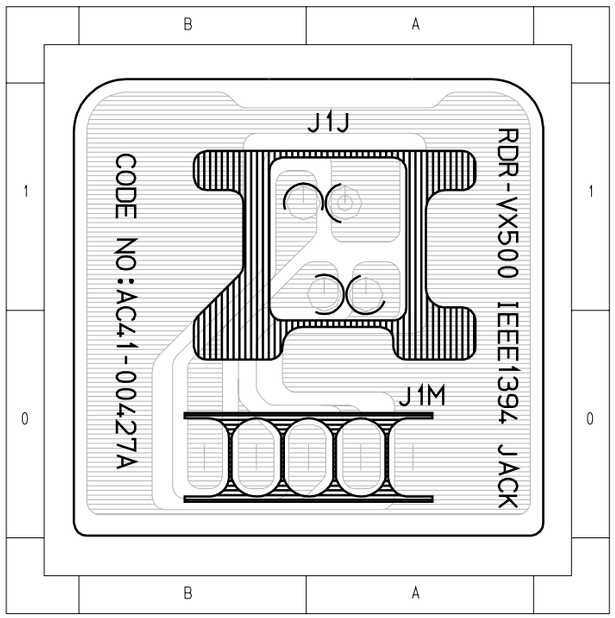


4-4 DV Input PCB

COMPONENT SIDE

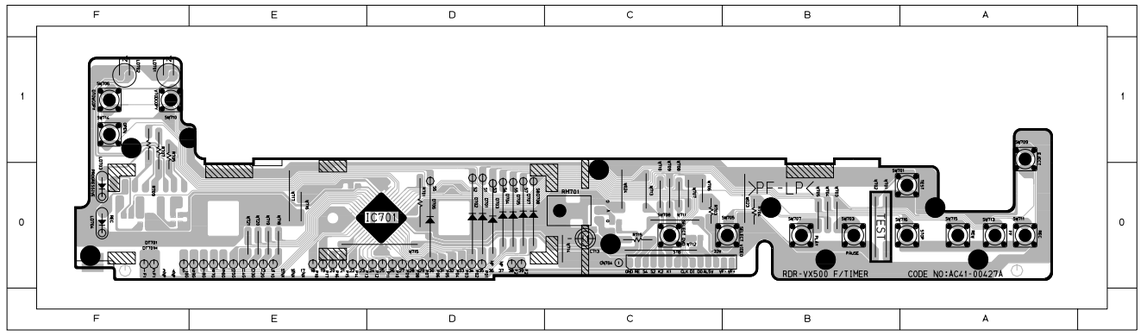


CONDUCTOR SIDE

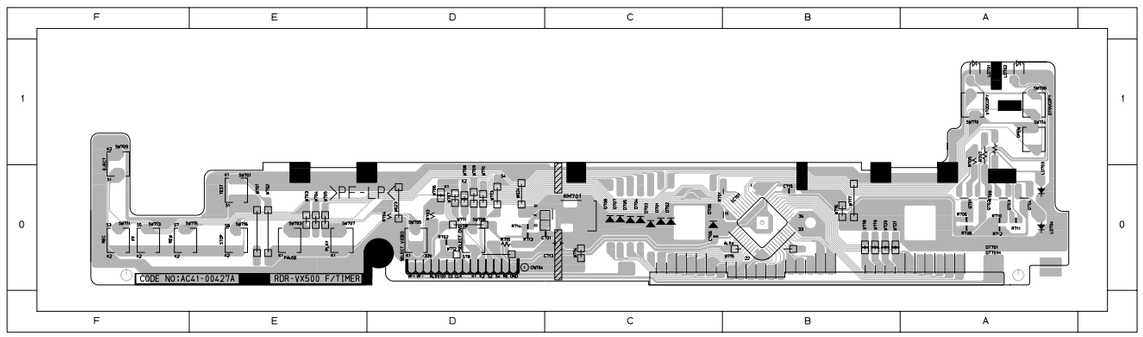


4-5 Function Timer PCB

COMPONENT SIDE



CONDUCTOR SIDE



5. Schematic Diagrams

◆ Block Identification of Main PCB - 5-3

5-1 S.M.P.S (VCR Main PCB) - 5-5

5-2 Power (VCR Main PCB) - 5-7

5-3 Logic (VCR Main PCB) - 5-9

5-4 A/V (VCR Main PCB) - 5-11

5-5 Hi-Fi (VCR Main PCB) - 5-13

5-6 Function Timer (Function Timer PCB) - 5-15

5-7 Encoder (DVD Main PCB) - 5-17

5-8 Decoder (DVD Main PCB) - 5-19

5-9 Video Decoder and Connector (DVD Main PCB) - - - - - - - - - - - - - - - - - - - 5-21

5-10 DV Interface and 1394 Connector (DVD Main PCB) - - - - - - - - - - - - - - - - - 5-23

5-11 Audio DAC and ADC (DVD Main PCB) - 5-25

5-12 Connectors and Power (DVD Main PCB) - 5-27

5-13 Mts/Tuner (JACK PCB) - 5-29

5-14 AV IN/OUT (JACK PCB) - 5-31

5-15 Component/Super Out (JACK PCB) - 5-33

Note

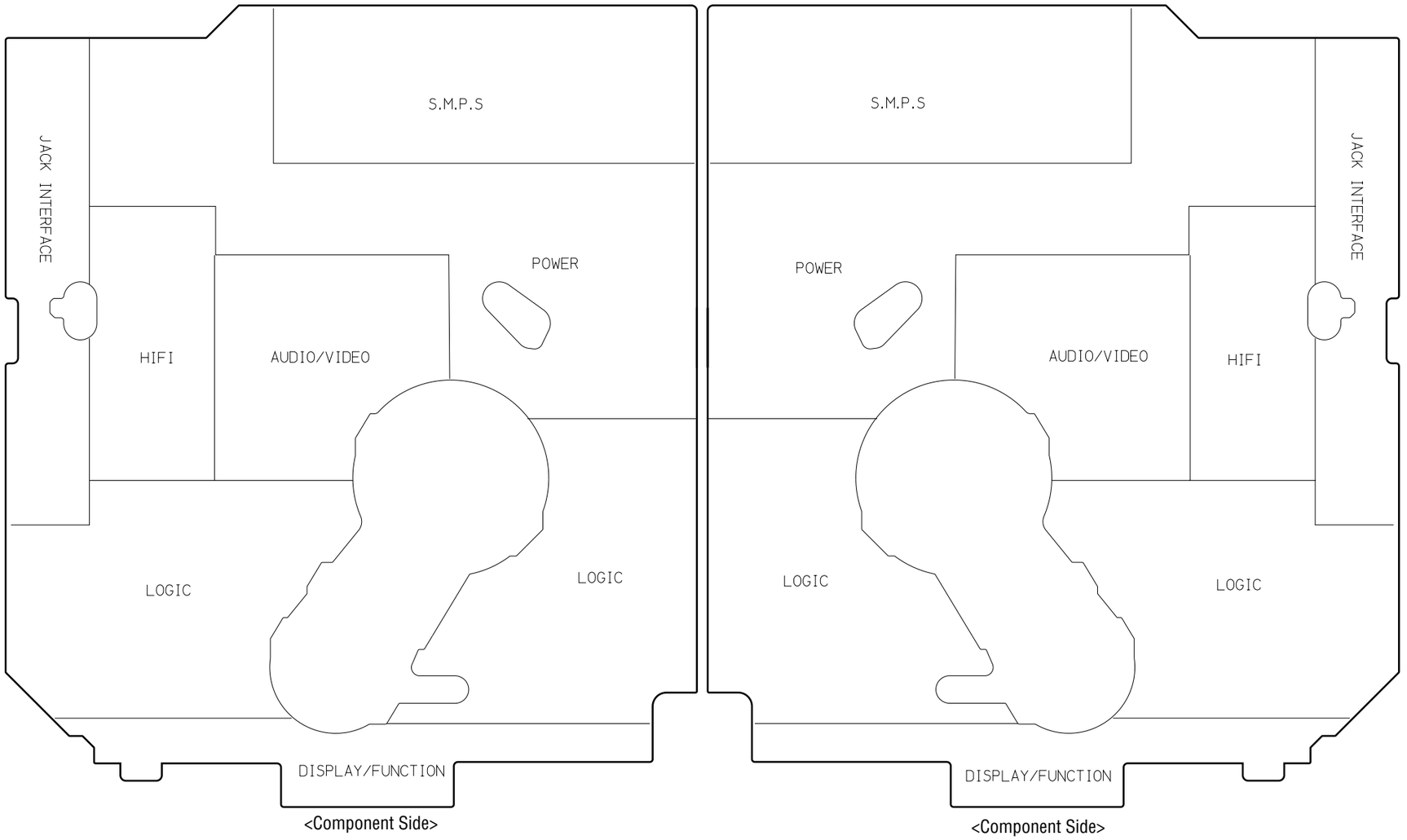
For schematic Diagram
- Resistors are in ohms, 1/8W unless otherwise noted.

Special note :
Most semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under the "electrostatically sensitive (ES) devices" section of this service manual.

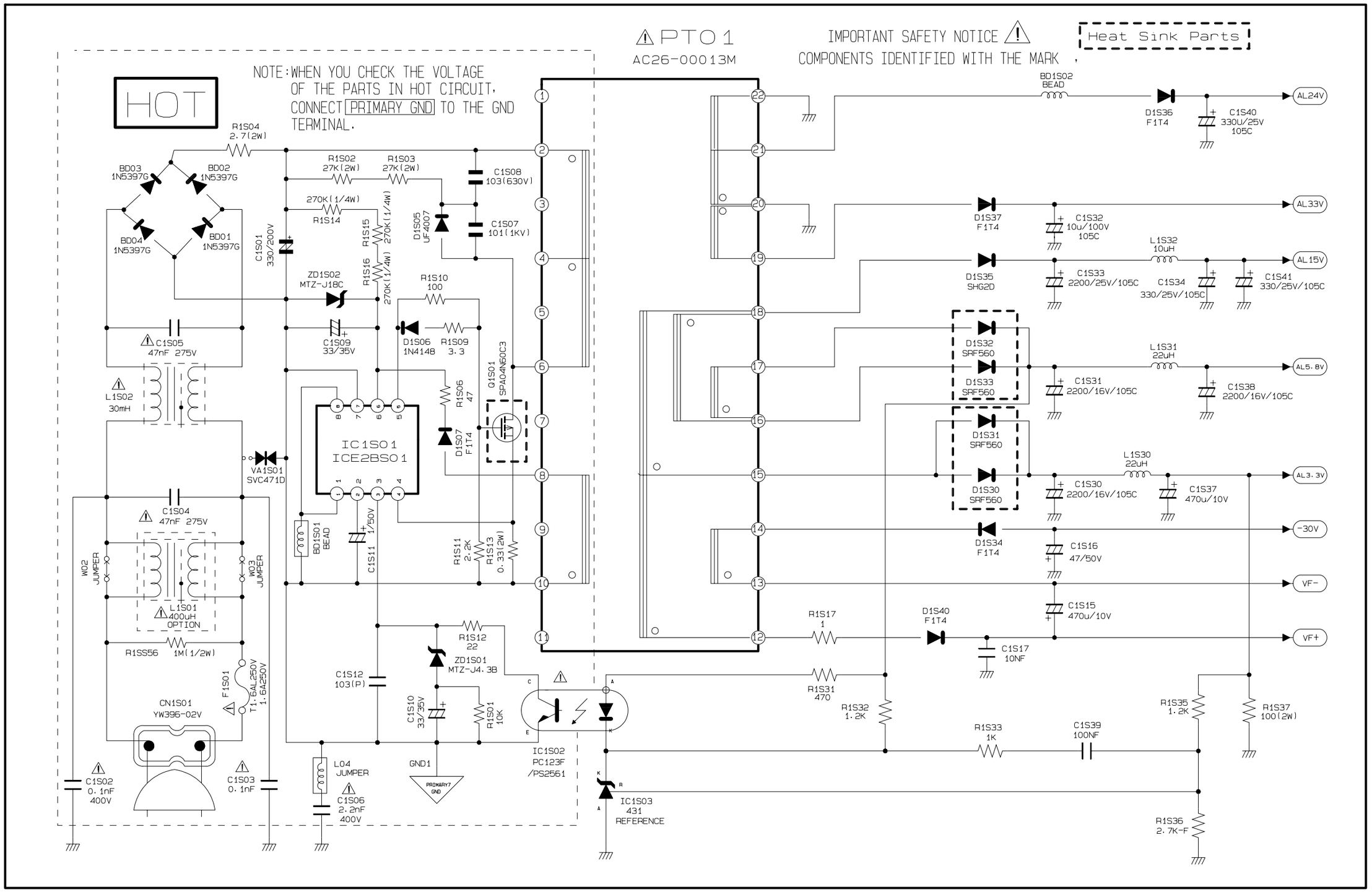
Important safety notices :
Components identified with the mark ⚠ have the special characteristics for safety. When replacing any of these components.
Use only the same type.

◆ Block Identification of Main PCB

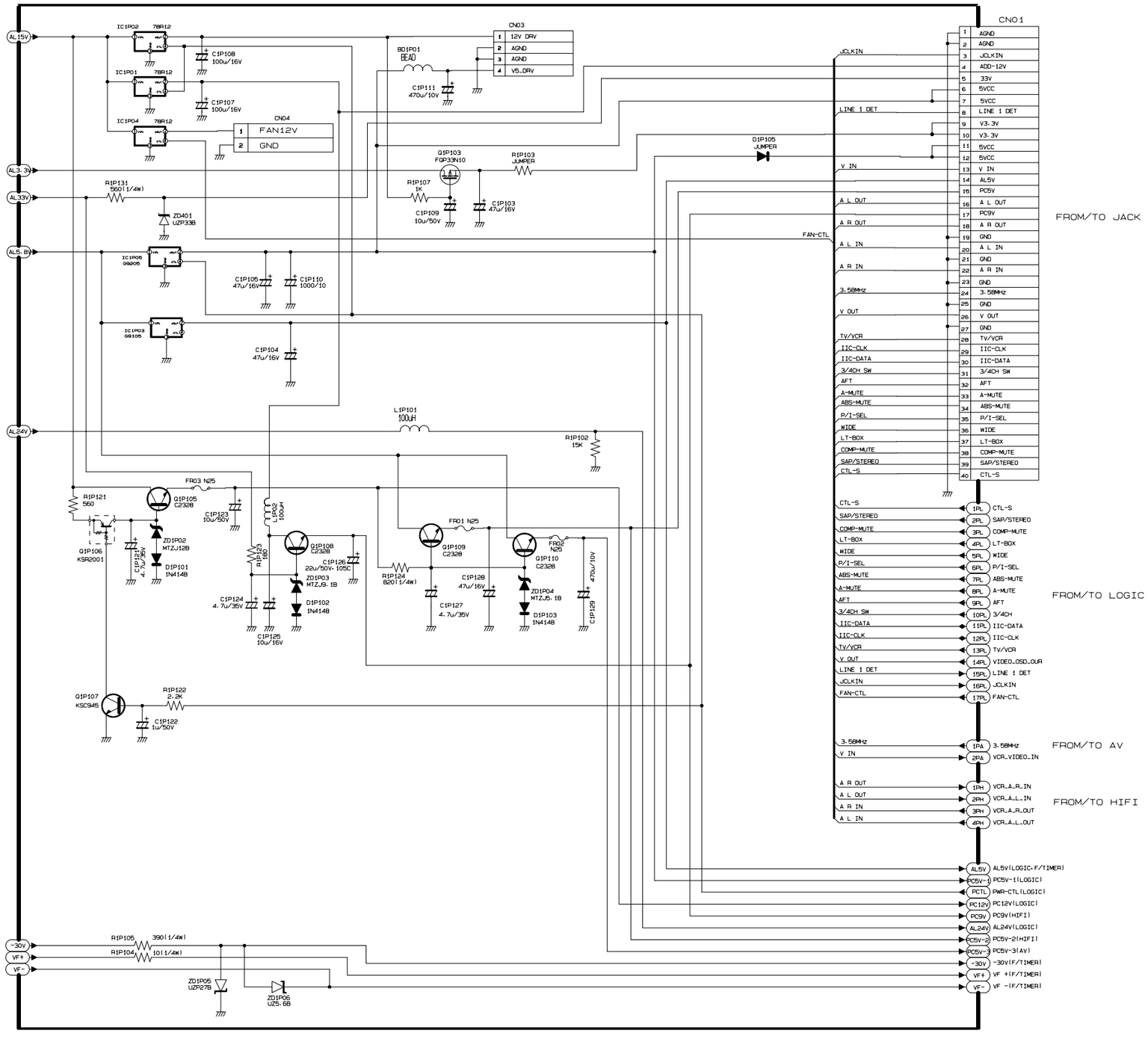
VCR MAIN PCB

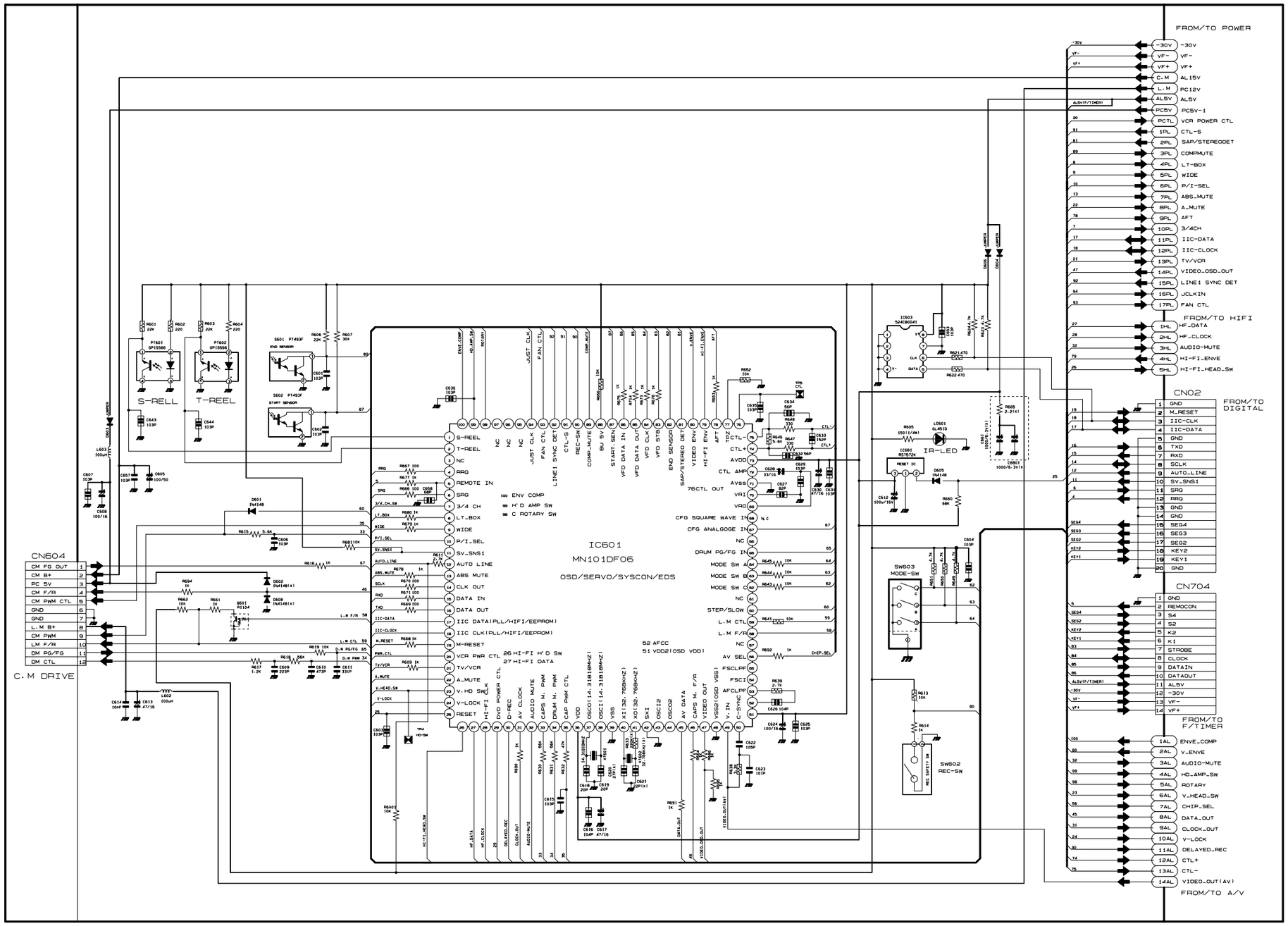


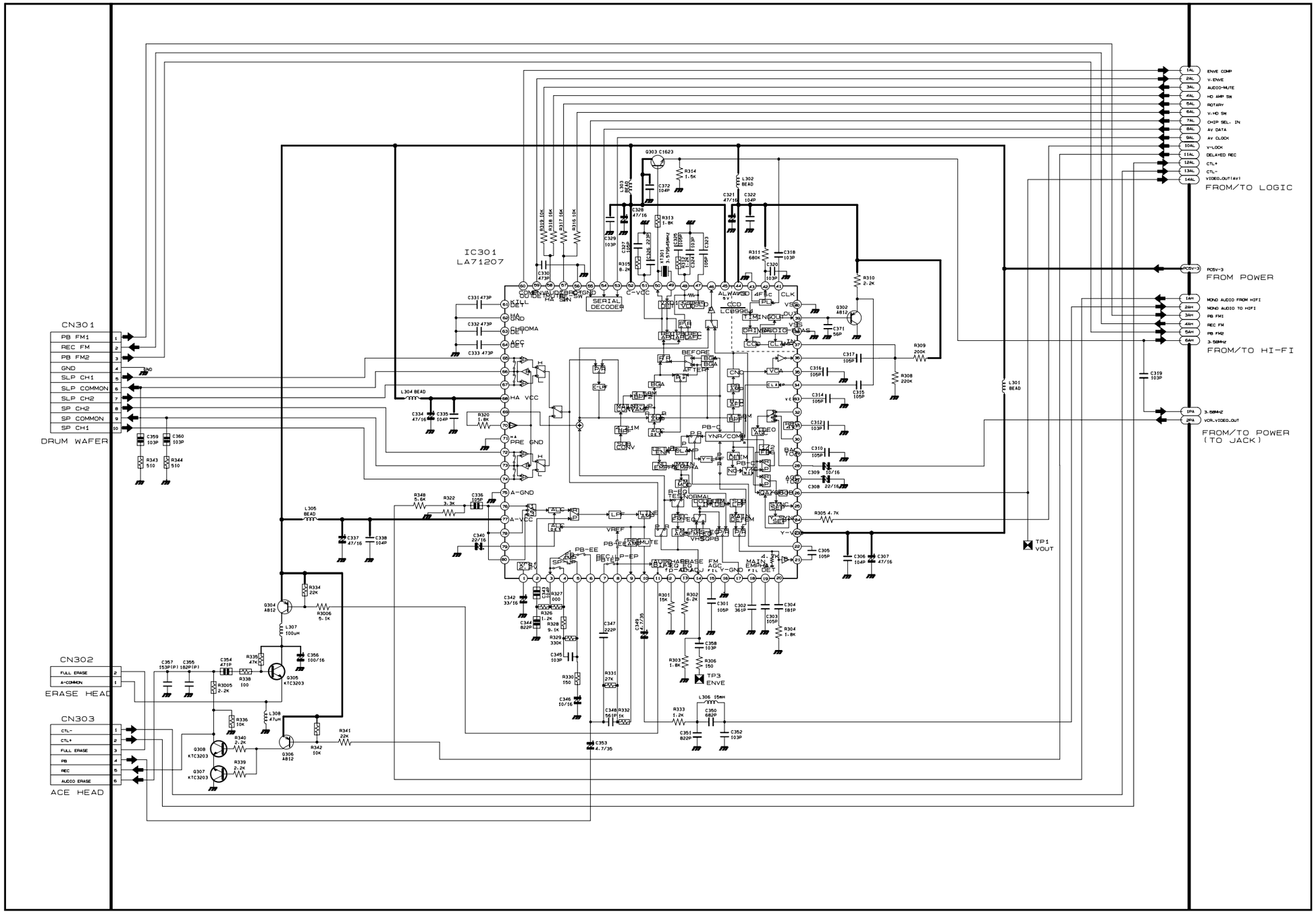
5-1 S.M.P.S. (VCR Main PCB)



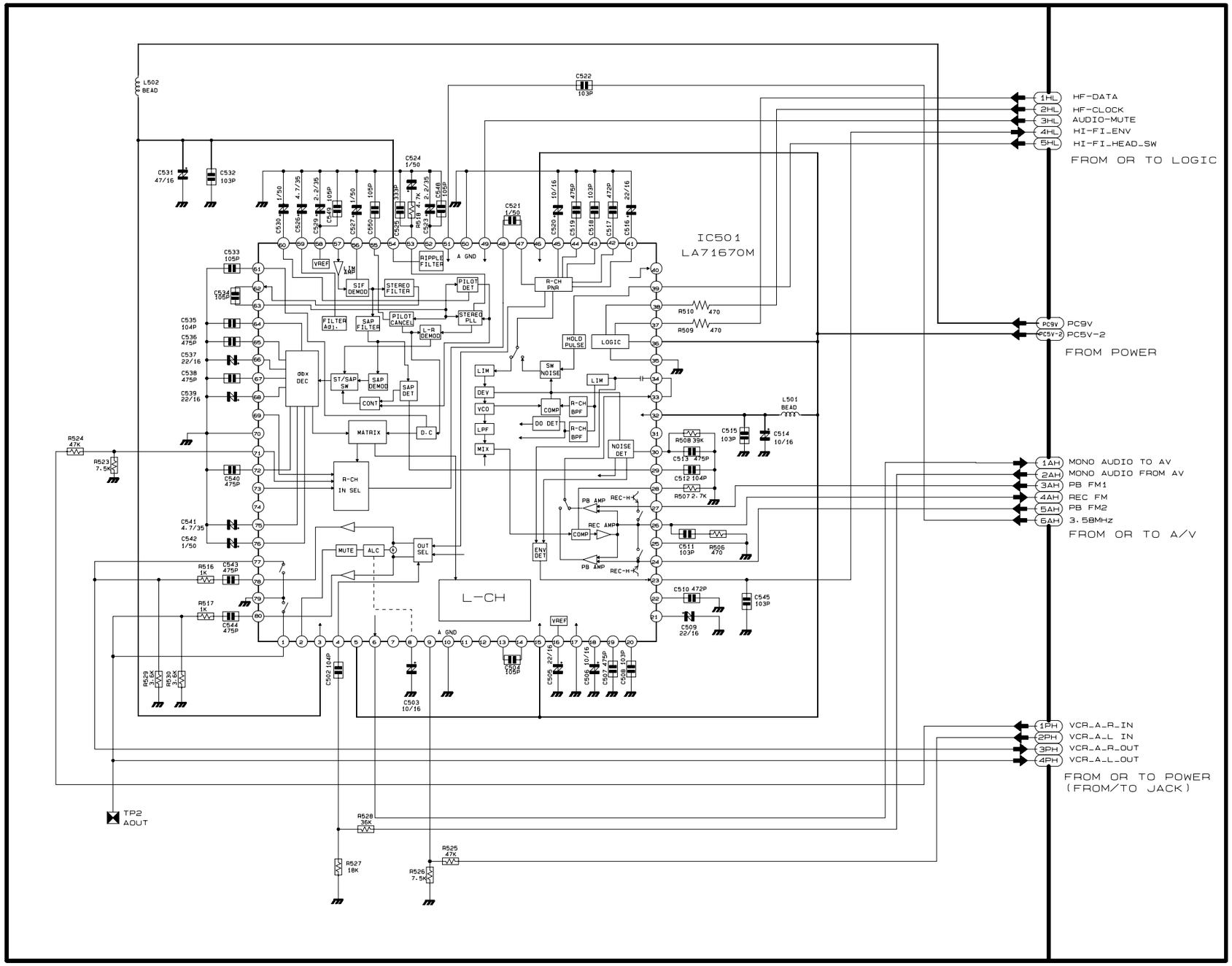
5-2 Power (VCR Main PCB)



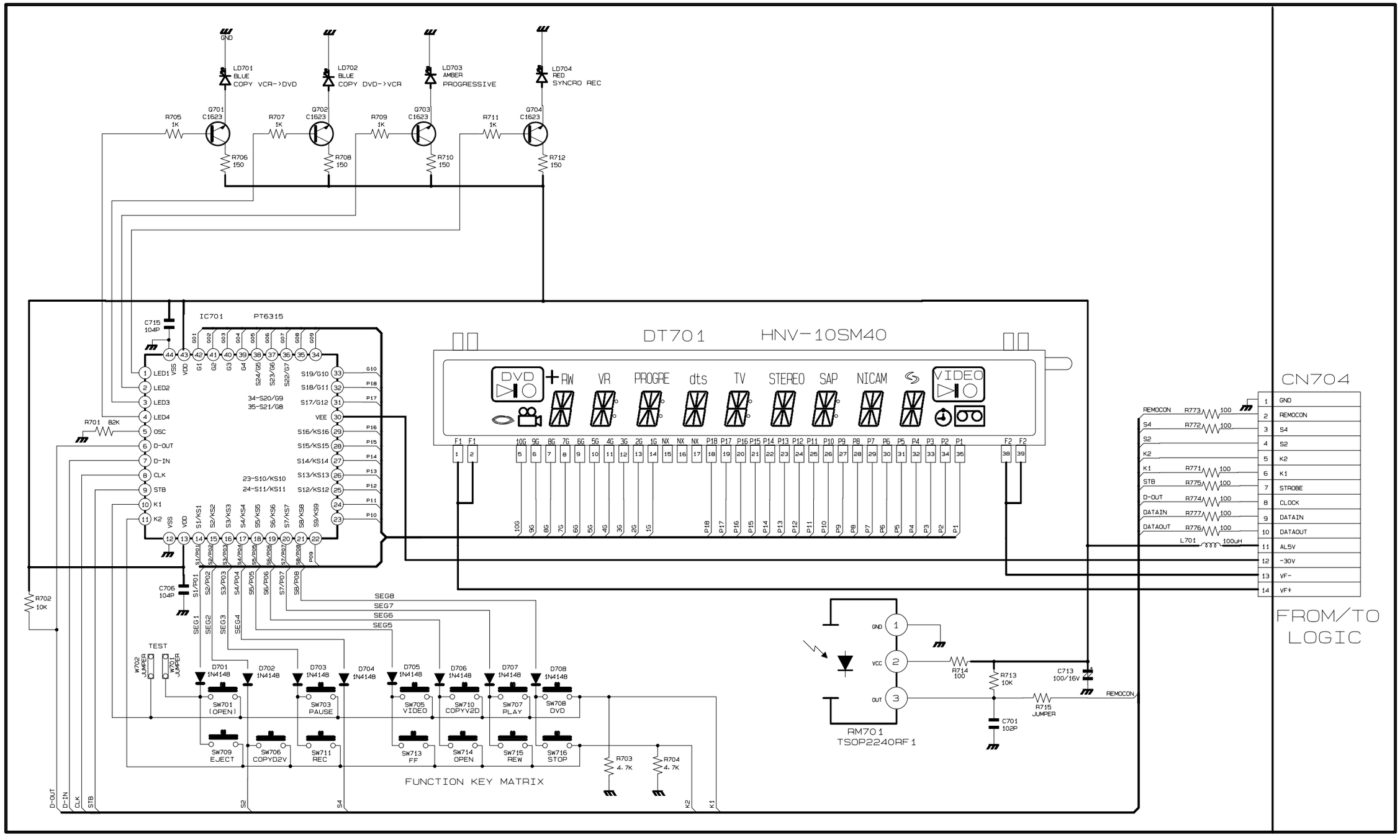

FROM/TO POWER
-30V
VF-
VF+
AL15V
PC12V
AL5V
PC5V-1
VCR POWER CTL
CTL-S
SAP/STEREODET
COMPMUTE
LT-BOX
WIDE
P/I-SEL
ABS_MUTE
A_MUTE
AFT
3/4CH
IIC-DATA
IIC-CLOCK
TV/VCR
VIDEO_OSD_OUT
LINE1 SYNC DET
JCLKIN
FAN CTL
FROM/TO HIFI
HF_DATA
HF_CLOCK
AUDIO-MUTE
HI-FI_ENVE
HI-FI_HEAD_SW
CN02
FROM/TO DIGITAL
GND
M_RESET
IIC-CLK
IIC-DATA
TXD
RXD
SCLK
AUTO_LINE
SV_SNS1
SRQ
GND
GND
SEG4
SEG3
SEG2
KEY2
KEY1
GND
CN704
GND
REMOCON
S4
S2
K2
K1
STROBE
CLOCK
DATAIN
DATAOUT
AL5V
-30V
VF-
VF+
FROM/TO F/TIMER
ENVE_COMP
V_ENVE
AUDIO-MUTE
HD_AMP_SW
ROTARY
V_HEAD_SW
CHIP_SEL
DATA_OUT
CLOCK_OUT
V-LOCK
DELAYED_REC
CTL+
CTL-
VIDEO_OUT(AV)
FROM/TO A/V
S-REEL
T-REEL
IR-LED
MODE-SW
REC-SW
IC601
MN1O1DF06
OSD/SERVO/SYSCON/EDS
CN604
C.M DRIVE
CM FG OUT
CM B+
PC 5V
CM F/R
CM PWM CTL
GND
GND
L.M B+
CM PWM
LM F/R
DM PG/FG
DM CTL


IC301
LA71207
CN301
PB FM1
REC FM
PB FM2
GND
SLP CH1
SLP COMMON
SLP CH2
SP CH2
SP COMMON
SP CH1
DRUM WAFER
CN302
FULL ERASE
A-COMMON
ERASE HEAD
CN303
CTL-
CTL+
FULL ERASE
PB
REC
AUDIO ERASE
ACE HEAD
ENVE COMP
V-ENVE
AUDIO-MUTE
HD AMP SW
ROTARY
V-HD SW
CHIP SEL. IN
AV DATA
AV CLOCK
V-LOCK
DELAYED REC
CTL+
CTL-
VIDEO.OUT(AV)
FROM/TO LOGIC
PCBV-3
FROM POWER
MONO AUDIO FROM HIFI
MONO AUDIO TO HIFI
PB FM1
REC FM
PB FM2
3.58MHz
FROM/TO HI-FI
3.58MHz
VCR.VIDEO.OUT
FROM/TO POWER
(TO JACK)
TP1
VOUT
TP3
ENVE

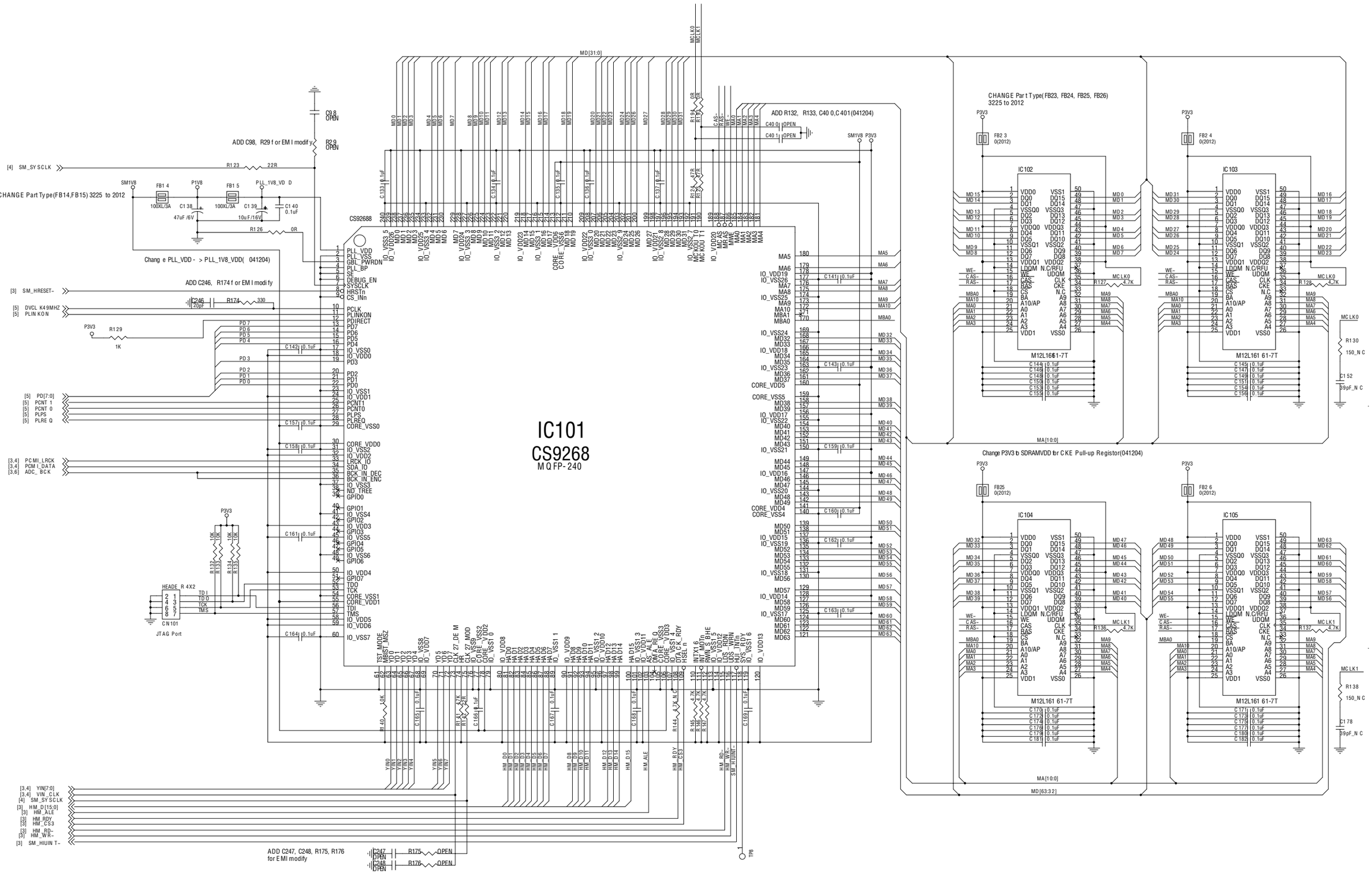
5-5 Hi-Fi (VCR Main PCB)



5-6 Function Timer (Function Timer PCB)



5-7 Encoder (DVD Main PCB)

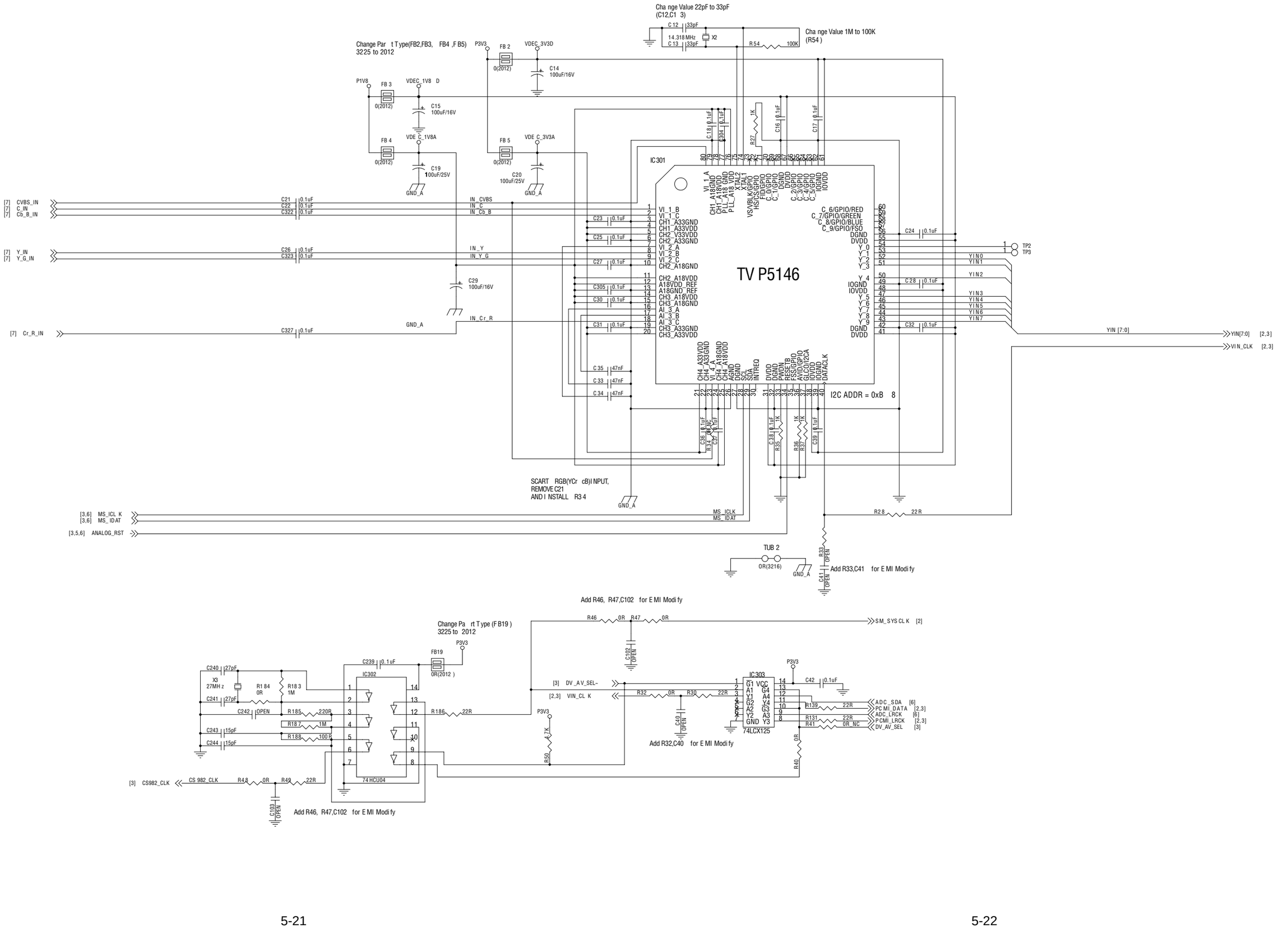


IC201

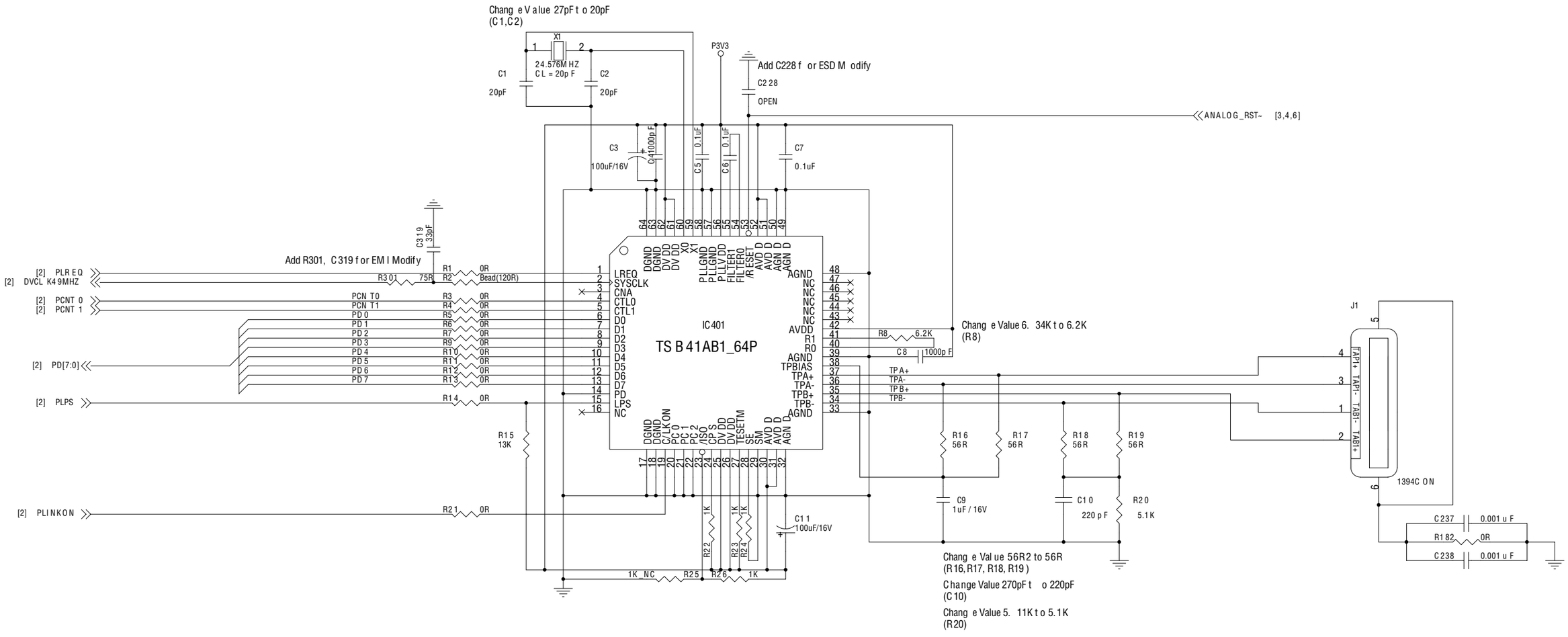
CS98202

240LQFP

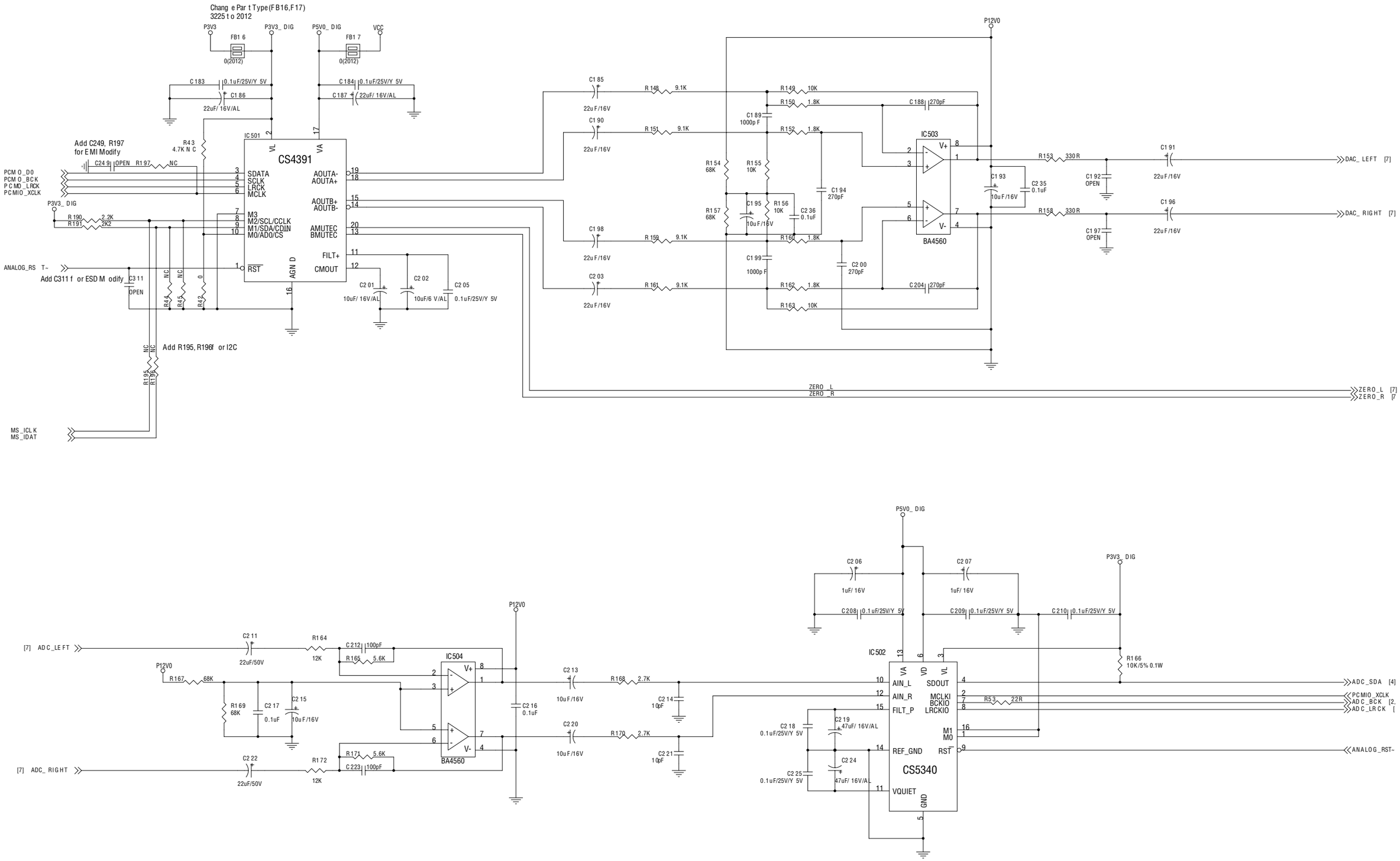
5-9 Video Decoder and Connector (DVD Main PCB)

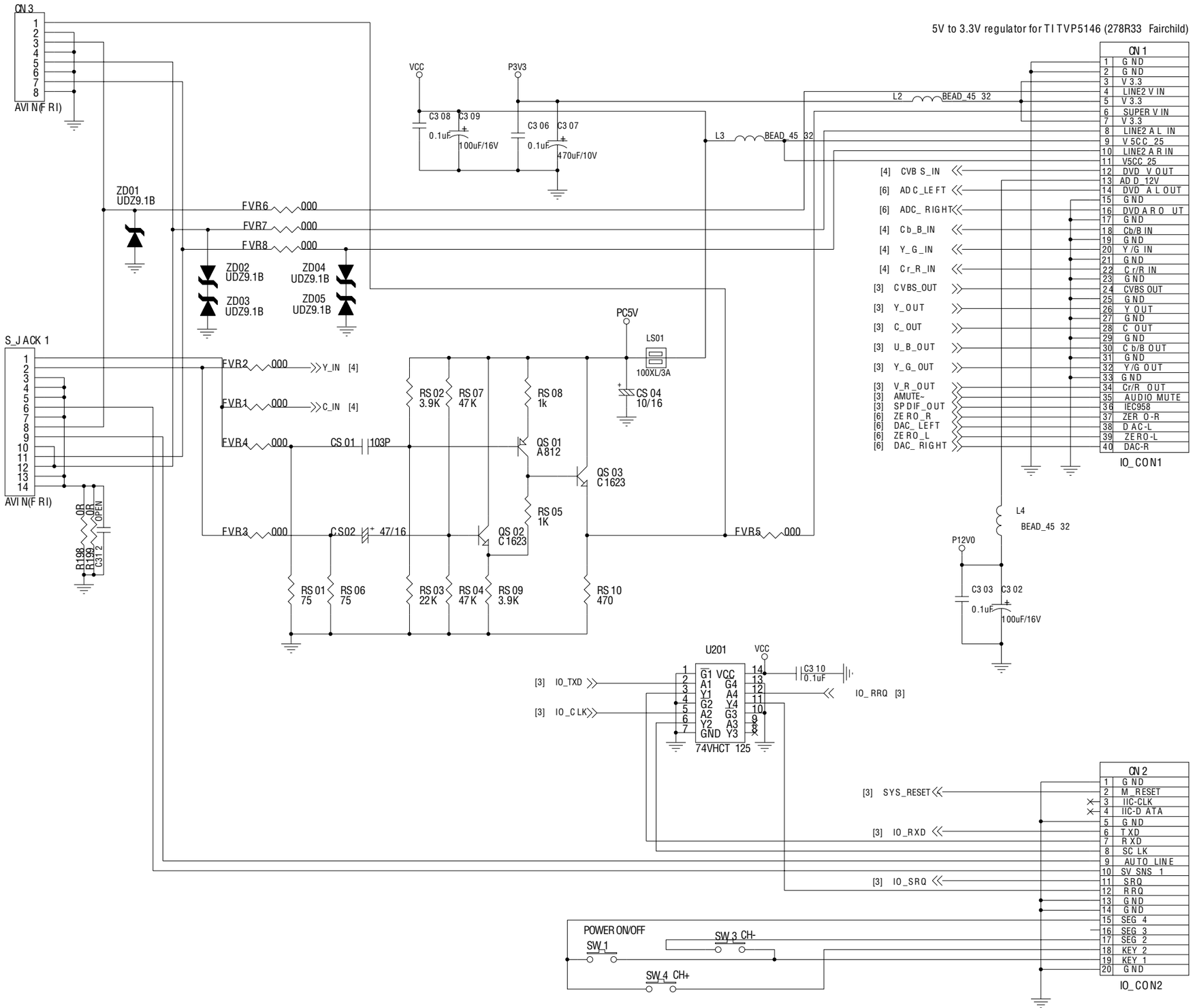

Cha nge Value 22pF to 33pF
(C12,C1 3)
Cha nge Value 1M to 100K
(R54)
Change Par t Type(FB2,FB3, FB4 ,F B5)
3225 to 2012
IC301
TV P5146
I2C ADDR = 0xB 8
SCART RGB(YCr cB)I NPUT,
REMOVE C21
AND I NSTALL R3 4
Add R33,C41 for E MI Modi fy
Add R46, R47,C102 for E MI Modi fy
Change Pa rt Type (F B19)
3225 to 2012
IC303
74LCX125
IC302
74 HCU04
Add R32,C40 for E MI Modi fy
Add R46, R47,C102 for E MI Modi fy

5-10 DV Interface and 1394 Connector (DVD Main PCB)

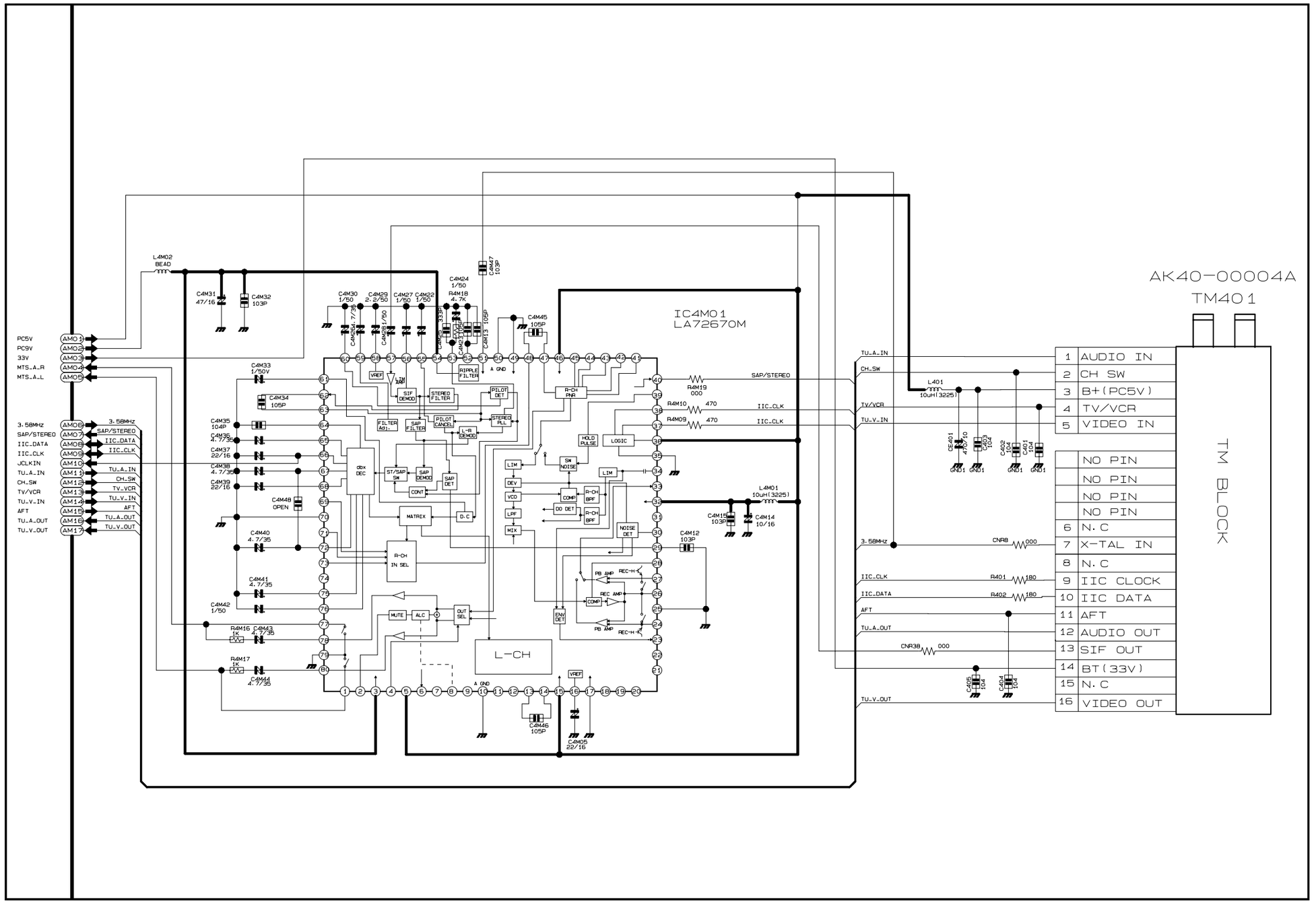


5-11 Audio DAC and ADC (DVD Main PCB)

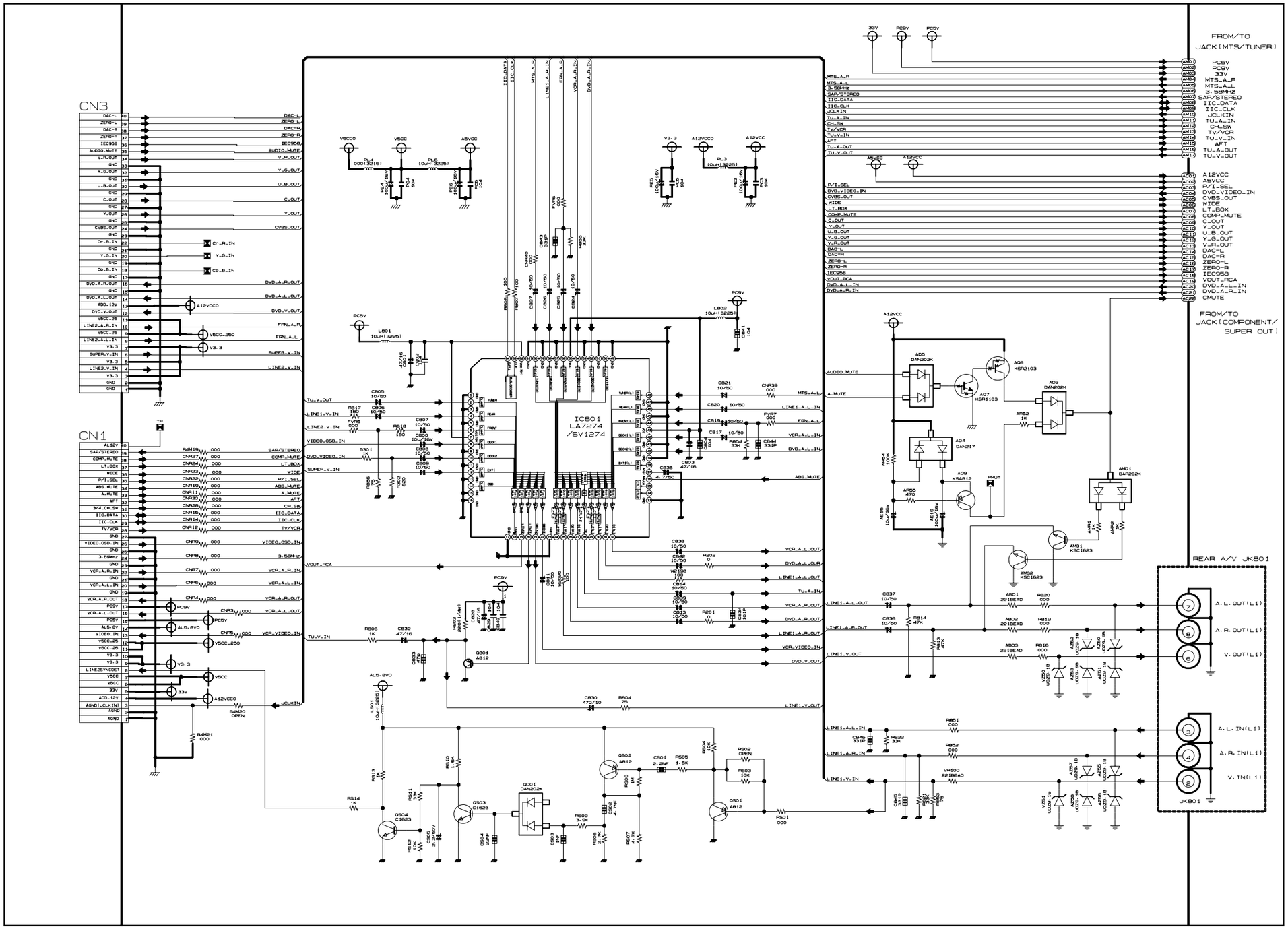



CN3
AVIN(FRI)
S_JACK 1
AVIN(FRI)
ZD01 UDZ9.1B
ZD02 UDZ9.1B
ZD03 UDZ9.1B
ZD04 UDZ9.1B
ZD05 UDZ9.1B
FVR6 000
FVR7 000
FVR8 000
FVR2 000
FVR1 000
FVR4 000
FVR3 000
FVR5 000
Y_IN [4]
C_IN [4]
CS01 103P
CS02 47/16
VCC
P3V3
C308 0.1uF
C309 100uF/16V
C306 0.1uF
C307 470uF/10V
L3 BEAD_45_32
L2 BEAD_45_32
PC5V
LS01 100XL/3A
CS04 10/16
RS02 3.9K
RS07 47K
RS08 1k
QS01 A812
QS03 C1623
RS05 1K
QS02 C1623
RS01 75
RS06 75
RS03 22K
RS04 47K
RS09 3.9K
RS10 470
R198 OR
R199 OR
C312 OPEN
5V to 3.3V regulator for TI TVP5146 (278R33 Fairchild)
CN1
1 GND
2 GND
3 V3.3
4 LINE2VIN
5 V3.3
6 SUPERVIN
7 V3.3
8 LINE2AL IN
9 V5CC_25
10 LINE2AR IN
11 V5CC_25
12 DVD_VOUT
13 ADD_12V
14 DVD_ALOUT
15 GND
16 DVDARO_UT
17 GND
18 Cb/BIN
19 GND
20 Y/GIN
21 GND
22 Cr/RIN
23 GND
24 CVBSOUT
25 GND
26 Y_OUT
27 GND
28 C_OUT
29 GND
30 Cb/BOUT
31 GND
32 Y/GOUT
33 GND
34 Cr/R_OUT
35 AUDIO MUTE
36 IEC958
37 ZER_O-R
38 DAC-L
39 ZERO-L
40 DAC-R
IO_CON1
[4] CVBS_IN
[6] ADC_LEFT
[6] ADC_RIGHT
[4] Cb_B_IN
[4] Y_G_IN
[4] Cr_R_IN
[3] CVBS_OUT
[3] Y_OUT
[3] C_OUT
[3] U_B_OUT
[3] Y_G_OUT
[3] V_R_OUT
[3] AMUTE~
[3] SPDIF_OUT
[6] ZERO_R
[6] DAC_LEFT
[6] ZERO_L
[6] DAC_RIGHT
L4 BEAD_45_32
P12V0
C303 0.1uF
C302 100uF/16V
U201
74VHCT 125
C310 0.1uF
[3] IO_TXD
[3] IO_CLK
IO_RRQ [3]
CN2
1 GND
2 M_RESET
3 IIC-CLK
4 IIC-DATA
5 GND
6 TXD
7 RXD
8 SC_LK
9 AUTO_LINE
10 SV_SNS_1
11 SRQ
12 RRQ
13 GND
14 GND
15 SEG_4
16 SEG_3
17 SEG_2
18 KEY_2
19 KEY_1
20 GND
IO_CON2
[3] SYS_RESET
[3] IO_RXD
[3] IO_SRQ
POWER ON/OFF
SW1
SW3 CH-
SW4 CH+

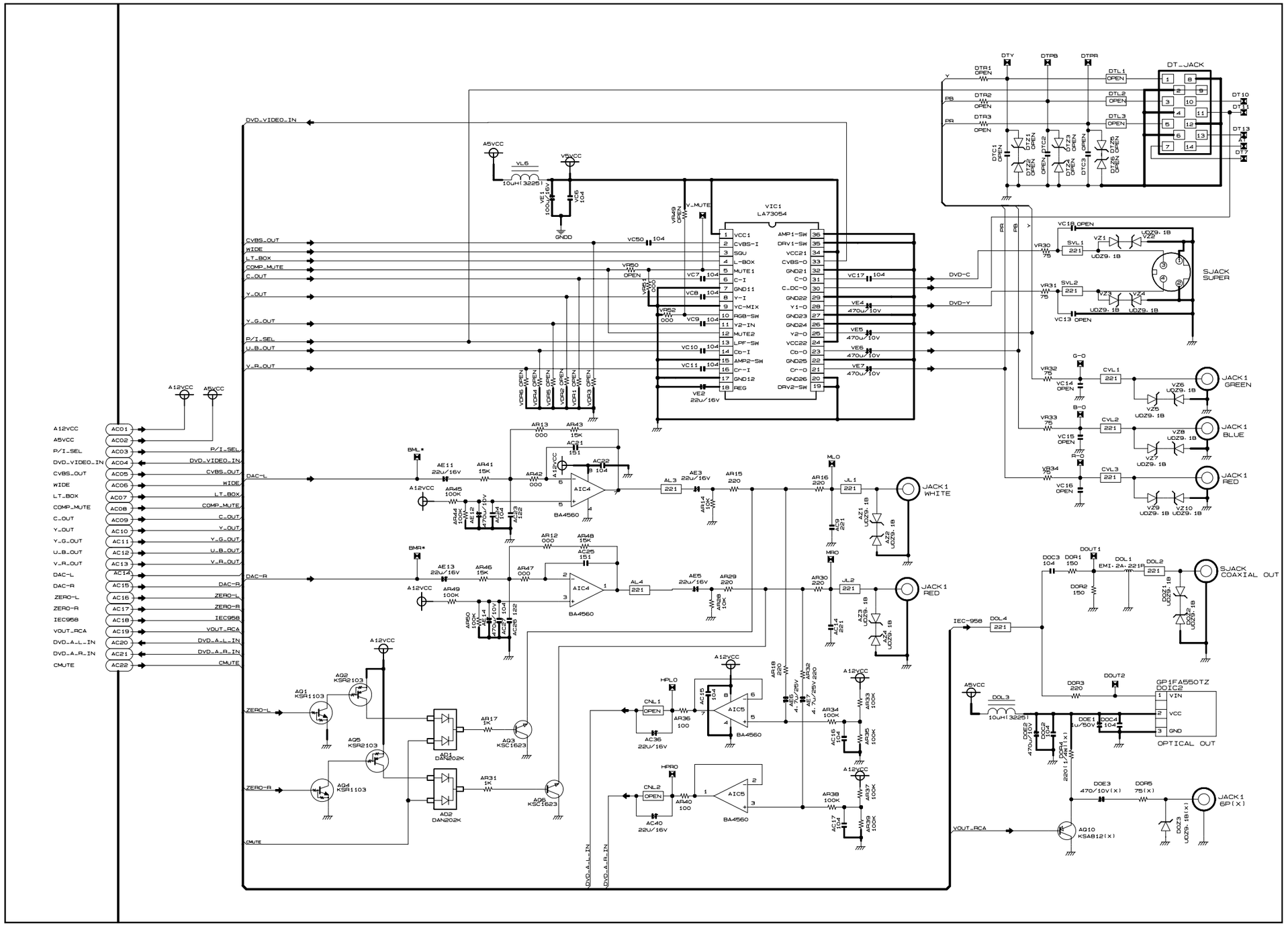
5-13 Mts/Tuner (JACK PCB)



5-14 AV IN/OUT (JACK PCB)



5-15 Component/Super Out (JACK PCB)



MEMO

6. ALIGNMENT AND ADJUSTMENTS

6-1 VCR ADJUSTMENT

6-1-1 Reference

1) X-Point (Tracking center) adjustment, “Head switching adjustment” can be adjusted with remote control.
2) When replacing the Main PCB Micom (IC601) and NVRAM (IC603: EEPROM) be sure to adjust the “Head switching adjustment”.
3) When replacing the cylinder ass'y, be sure to adjust the “X-Point” and “Head switching adjustment”.
4) How to adjust.
   - Intermittently short-circuit the Test Point on Function Timer PCB with pincers to the adjustment mode.
   - If the corresponding adjustment button is pressed, the adjustment is performed automatically.
   - When the adjustment is completed, be sure to turn the power off.

6-1-1(a) Location of adjustment button of remote control

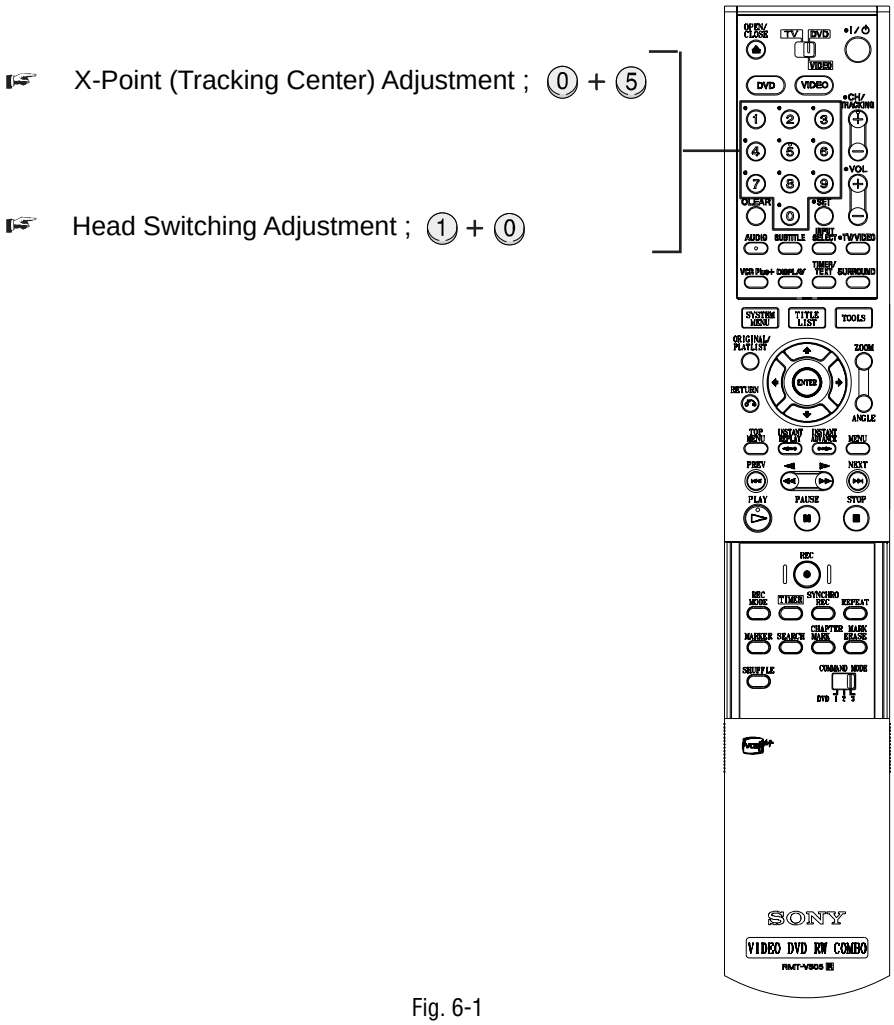


Fig. 6-1

6-1-1(b) TEST location for adjustment mode setting

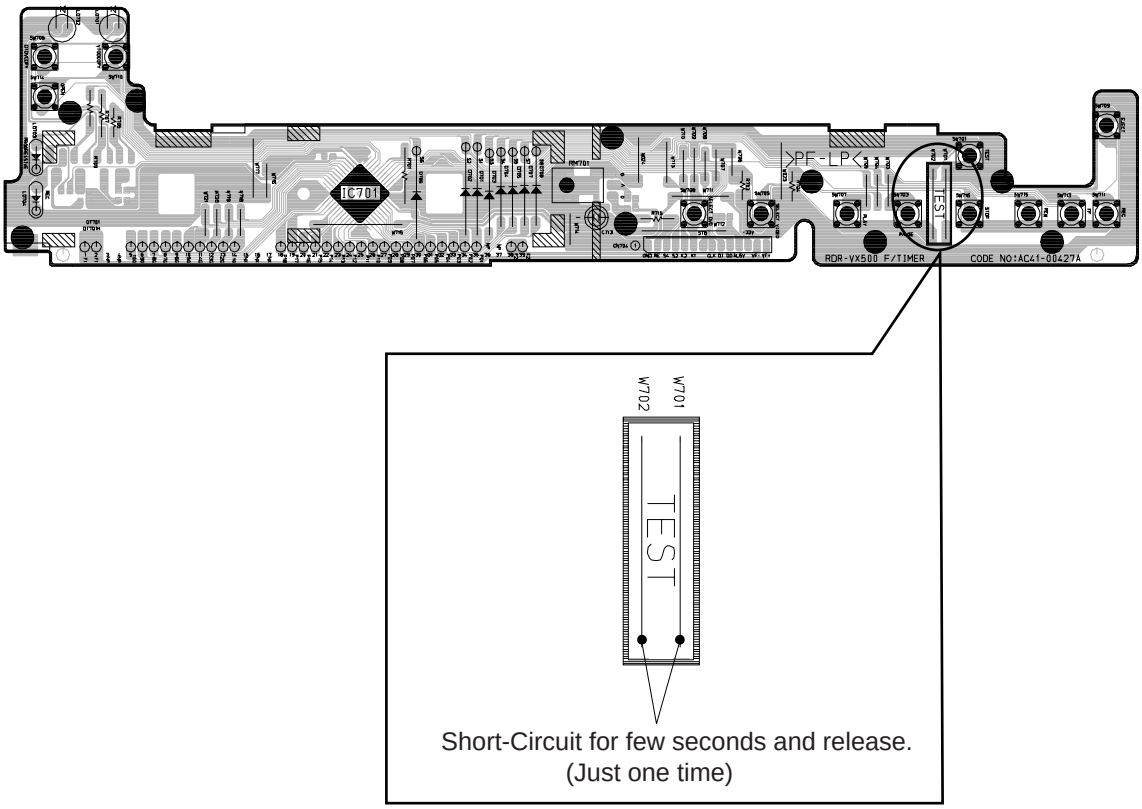


Fig. 6-2 Function Timer PCB (Top View)

6-1-2 Head Switching Point Adjustment

1) Playback the alignment tape.
2) Intermittently short-circuit the two Test Points on Function Timer PCB while setting the adjustment mode. (See Fig. 6-2)
3) Press the “1, 0” buttons ; remote control adjustment operates automatically. (See Fig. 6-1)

6-2 VCR MECHANICAL ADJUSTMENT

6-2-1 Tape Transport System and Adjustment Locations

The tape transport system has been adjusted precisely in the factory. Alignment is not necessary except for the following :

1) Noise observed on the screen.
2) Tape damage.
3) Parts replacement in the tape transport system.

Lower flange height of tape guide is used as the reference for the transport adjustment.
To maintain the height of the tape guide and prevent damage, do not apply excessive force onto the main base.

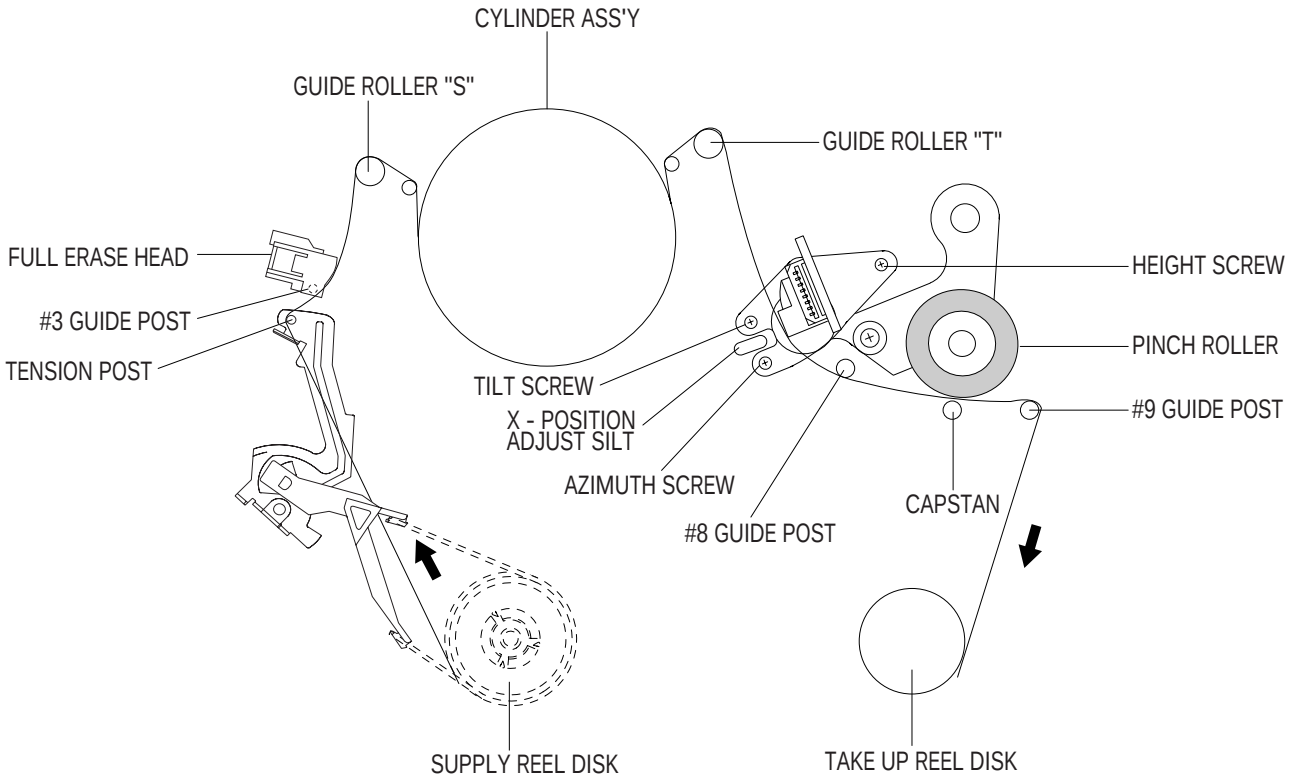


Fig. 6-3 Location of Tape Transport Adjustment

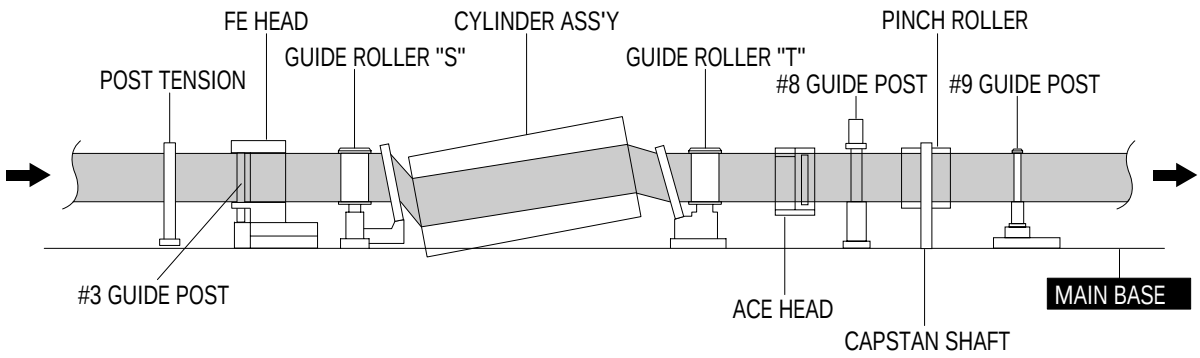


Fig. 6-4 Tape Travel Diagram

6-2-2 Tape Transport System Adjustment

When parts are replaced, perform the required adjustments by referring to procedures for the tape transport system. If there are any changes to the tape path, first run a T-120 tape and make sure excessive tape wrinkle does not occur at the tape guides.

◆ If tape wrinkle is observed at the guide roller S, T, turn the guide roller S, T until wrinkle disappears.
◆ If the tape wrinkle is still observed at the tape guide, perform the tilt adjustment of the ACE head.

(1) ACE Head Assembly Adjustment

a. ACE HEAD HEIGHT ADJUSTMENT

1) Run the alignment tape (Color bar) in the playback mode.
2) Observe surface of the audio head using a dental mirror.
3) Turn screw (C) clockwise or counterclockwise until the gap of lower tape edge and the lower edge of the control head is about 0.25mm. (Refer to Fig. 6-5 and 6-6)

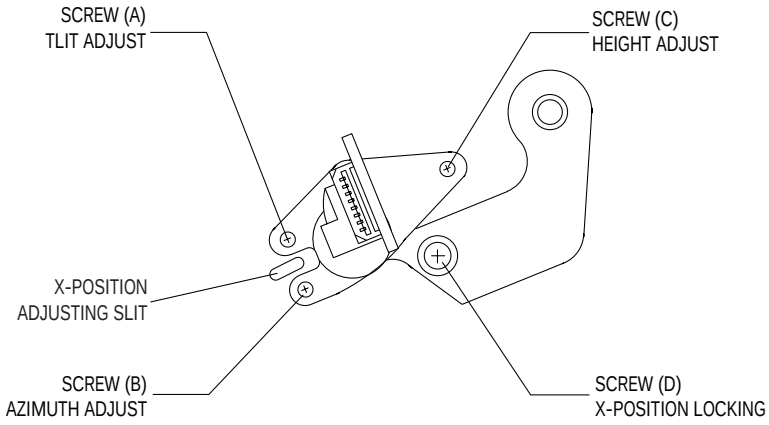


Fig. 6-5 Location of ACE Head Adjustment Screw

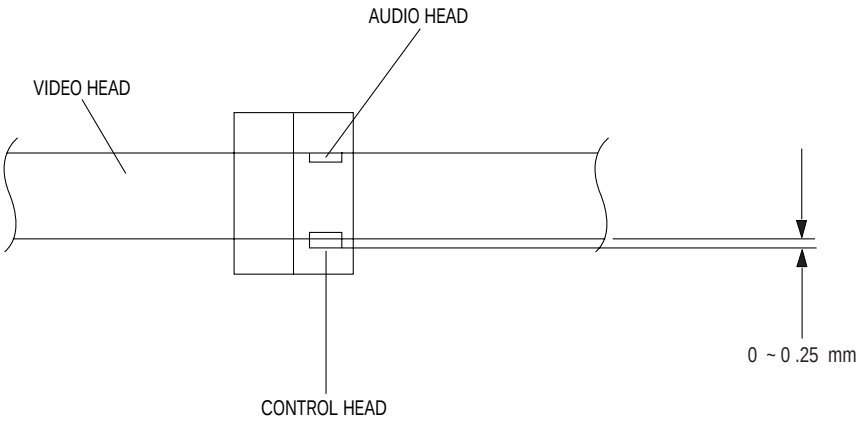


Fig. 6-6 ACE Head Height Adjustment

b. ACE HEAD TILT ADJUSTMENT

1) Playback a blank tape and observe the position of the tape at the lower flange of tape guide.
2) Confirm that there is no curl or wrinkle at the lower flange of tape guide as shown in Fig. 6-7 (B).
3) If a curl or wrinkle of the tape occurs, slightly turn the screw (A) tilt adjust on the ACE head ass'y.
4) Reconfirm the ACE head height.

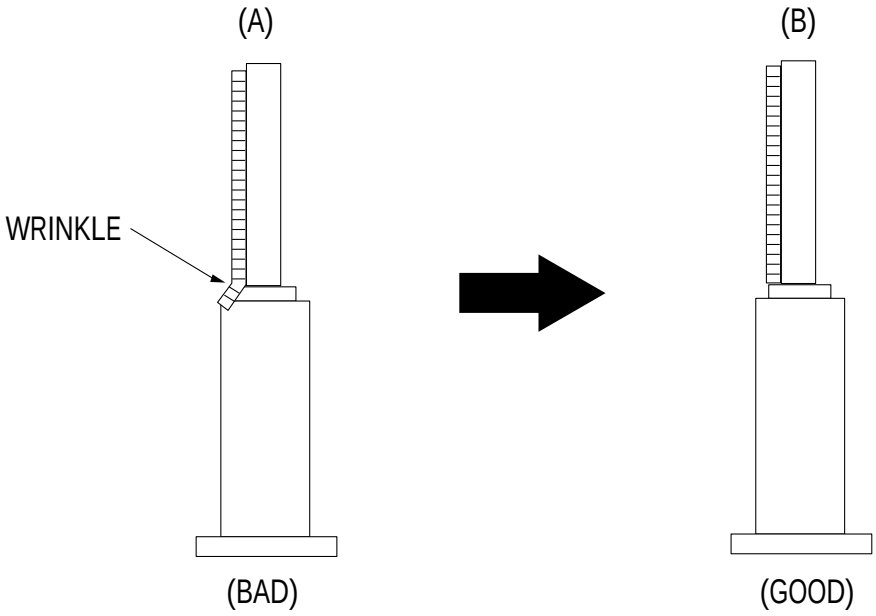


Fig. 6-7 Tape Guide Check

c. AUDIO AZIMUTH ADJUSTMENT

1) Load alignment tape (Mono scope) and playback the 7KHz signal.
2) Connect channel-1 scope probe to audio output.
3) Adjust screw (B) to achieve maximum audio level. (See Fig. 6-5)

d. ACE HEAD POSITION (X-POINT) ADJUSTMENT

1) Playback the alignment tape (Color bar)
2) Intermittently short-circuit the two Test Points on Function Timer PCB. (See Fig. 6-2)
3) Press the “0, 5” remote control buttons, then adjustment is operates automatically. (See Fig. 6-1)
4) Connect the CH-1 probe to “Envelope” the CH-2 probe to “H’D switching pulse” and then trigger to CH-1.
5) Insert the (-) driver into the X-Point adjustment hole and adjust it so that envelope waveform is maximum.

Test point: TP2 (Audio Output)
TP3 (Envelope)
TP4 (H’D S/W -Trigger)
TP5 (Control Pulse)

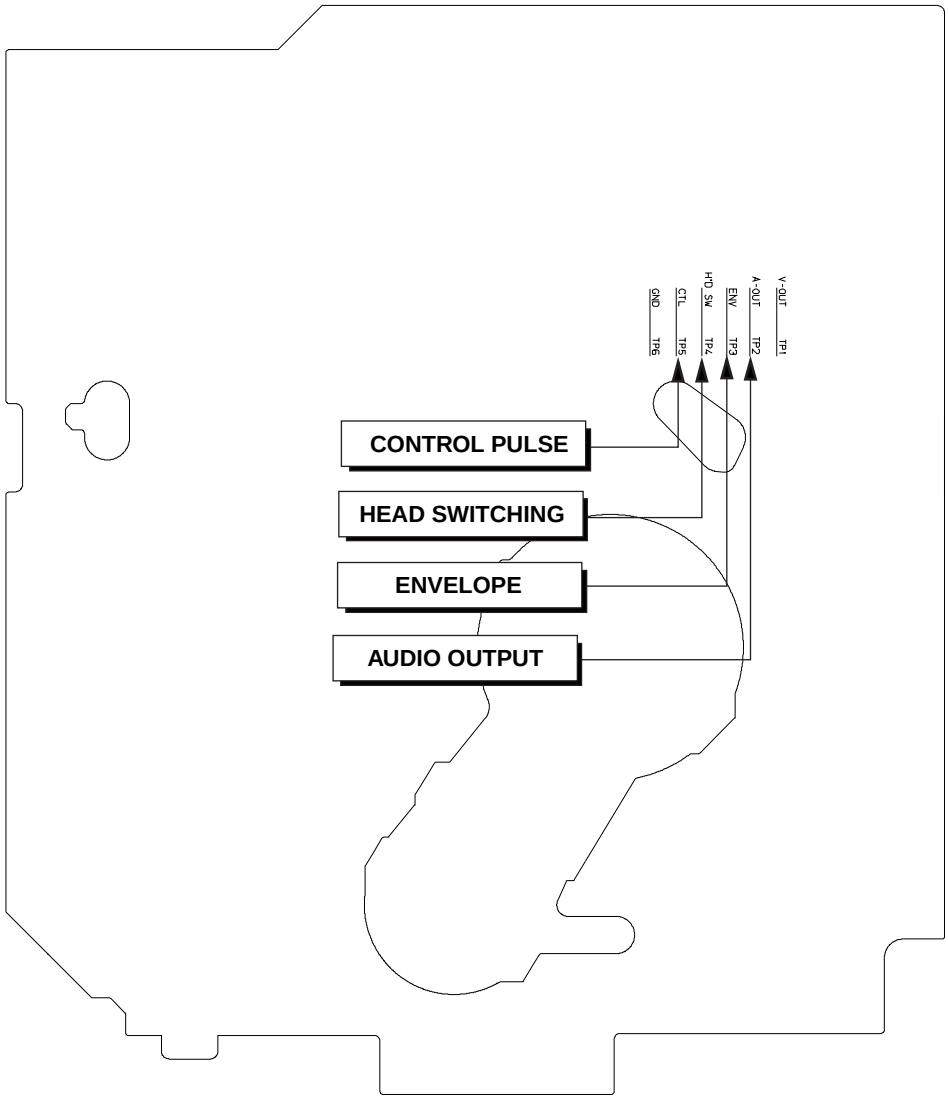


Fig. 6-8 Location of Test point (VCR Main PCB-Top View)

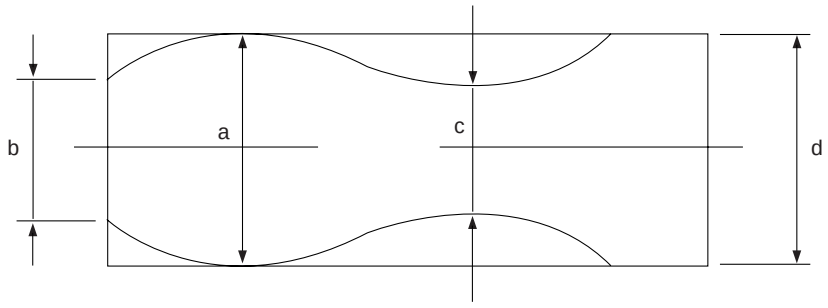
(2) Linearity adjustment (Guide roller S, T adjustment)

1) Playback the Mono Scope alignment tape (SP mode).
2) Observe the video envelope signal on an oscilloscope (triggered by the video switching pulse).
3) Make sure the video envelope waveform (at its minimum) meets the specification shown in Fig. 6-9.
   If it does not, adjust as follows :

Note:

a=Maximum output of the video RF envelope.
b=Minimum output of the video RF envelope at the entrance side.
c=Minimum output of the video RF envelope at the center point.
d=Maximum output of the video RF envelope at the exit side.

4) If the section A in Fig. 6-10 does not meet the specification, adjust the guide roller S up or down.
5) If the section B in Fig. 6-10 does not meet the specification, adjust the guide roller T up or down.



a b c d

c,b,d/a ≧ 63%

Fig. 6-9 Envelope Waveform Adjustment

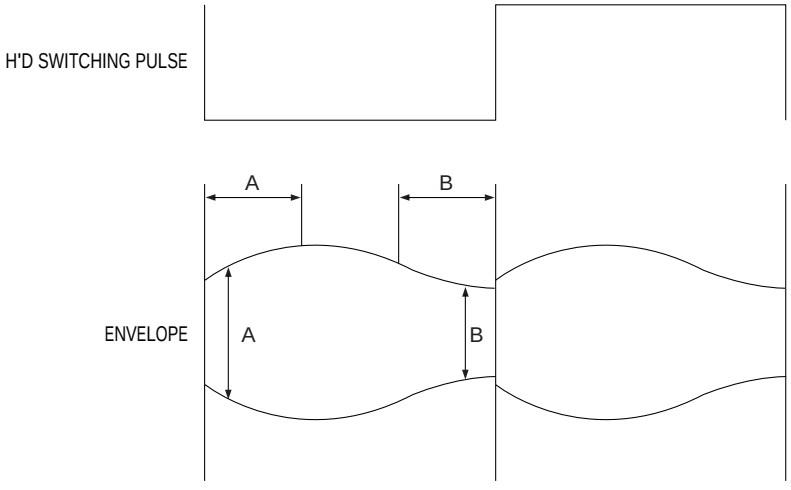


Fig. 6-10 Adjustment Points

6) Play back the Mono Scope alignment tape (SP mode).
7) Connect an oscilloscope CH-1 to the “Envelope” and CH-2 to the “H’D SW Pulse” for triggering.
8) Turn the guide roller heads with a flat head ( ) driver to obtain a flat video RF envelope as shown in Fig. 6-11.

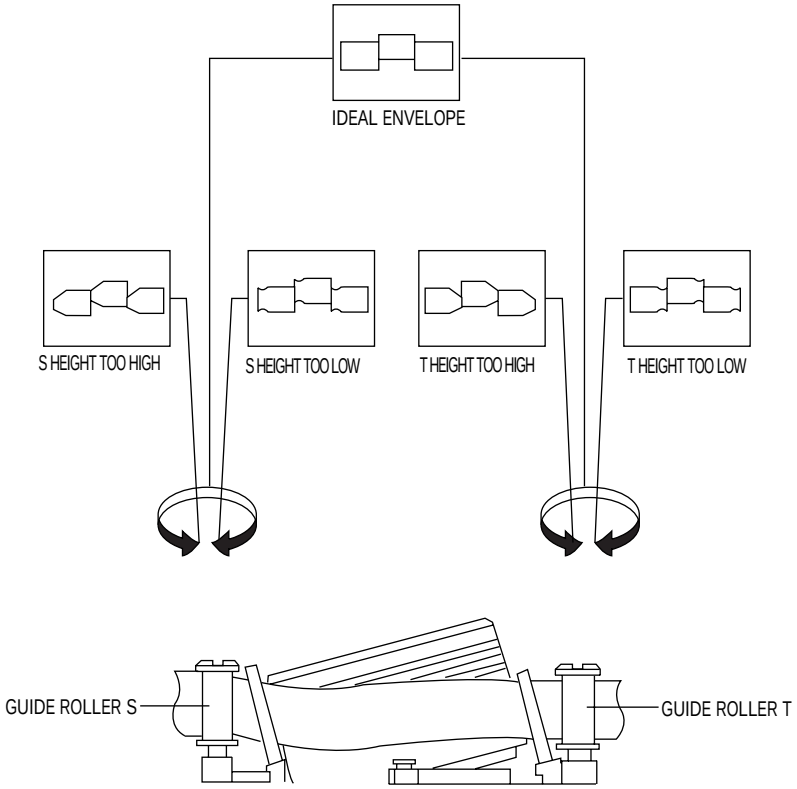


Fig. 6-11 Guide Roller S, T Height Adjustment

(3) Check Transitional Operation from RPS to Play

Check transition from RPS mode to play mode : Using a pre-recorded SP tape, make sure the entry side of envelope comes to an appropriate steady state within 3 seconds (as shown in Fig. 6-12).
If the envelope waveform does not reach specified peak-to peak amplitude within 3 seconds, adjust as follows :

1) Make sure there is no gap between the supply roller lower flange and the tape.
   If there is a gap, adjust the supply guide roller again.
2) Change operation mode from the RPS to the play mode (again) and make sure the entry side of envelope rises within 3 second.

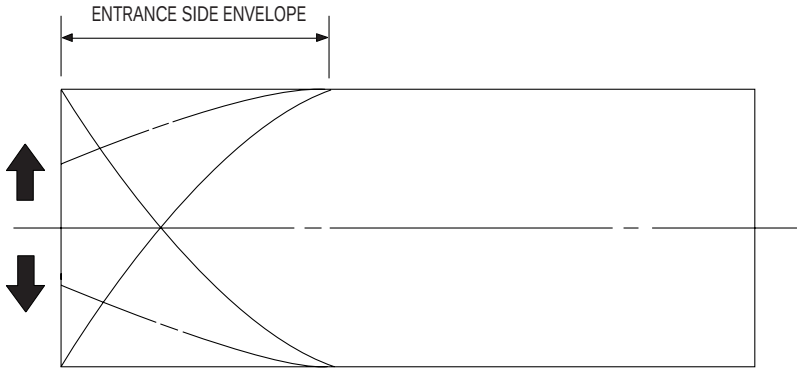


Fig. 6-12 Video Envelope Rising when Operation mode Changes from RPS to Play Mode

(4) Envelope Check

1) Make recordings on T-120 (E-120) and T-160 (E-180) tape.
   Make sure the playback output envelope meets the specification as shown in Fig. 6-13.
2) Play back a self recorded tape (recording made on the unit using with T-120 (E-120).
   The video envelope should meet the specification as shown in Fig. 6-13.
   In SP mode, (A) should equal (B).
   If the head gap is wide, upper cylinder should be checked.

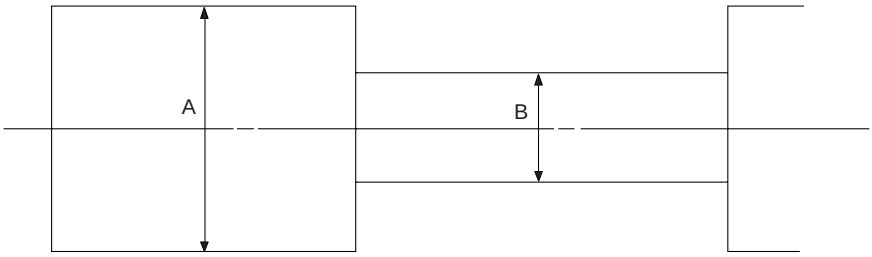


Fig. 6-13 Envelope Input and Output Level

(5) Tape Wrinkle Check

1) Run the T-160 (E-180) tape in the playback, FPS, RPS and Pause modes and observe tape wrinkle at each guide.
2) If excessive tape wrinkle is observed, perform the following adjustments in Playback mode :

- Tape wrinkle at the guide roller S, T section : Linearity adjustment.
- Tape wrinkle at tape guide flange : ACE head assembly coarse adjustment.

6-2-3 Reel Torque

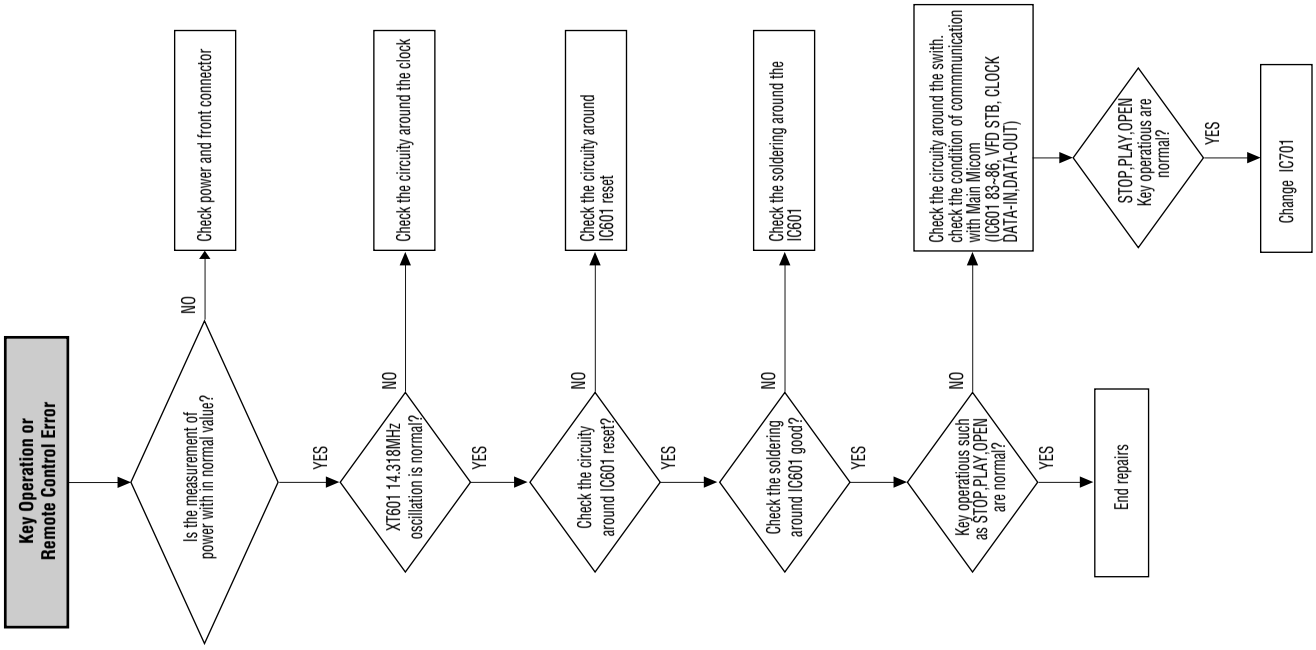
1) The rotation of the capstan motor causes the holder clutch ass'y to rotate through the belt pulley.
2) The spring wrap PLAY/REV of holder clutch ass'y drives the disk reel S, T through gear idler by rotation of gear center ass'y.
3) Brake is operated by slider cam at FF/REW mode.
4) Transportation of accurate driving force is done by gears. (Gear Center Ass'y)

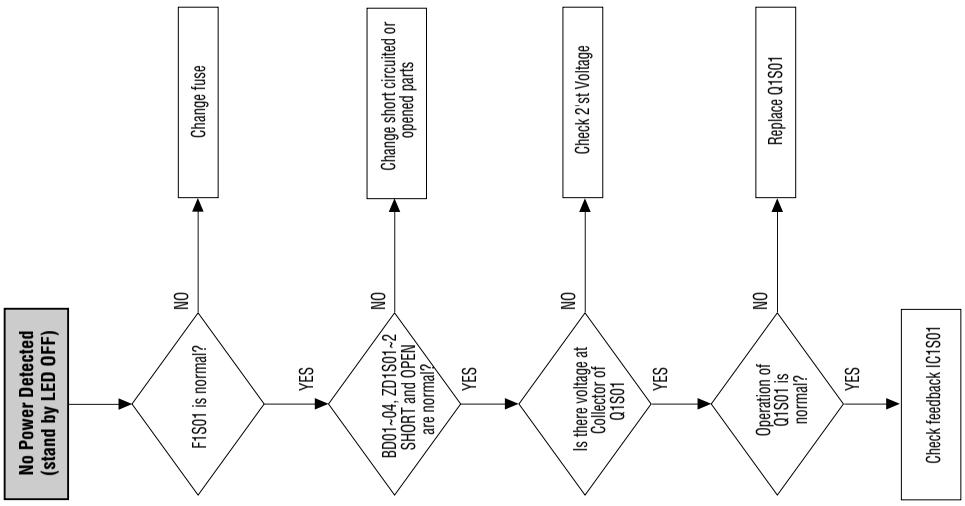
Note: If the spec. does not meet the followings specifications, replace the holder clutch ass'y and then recheck.

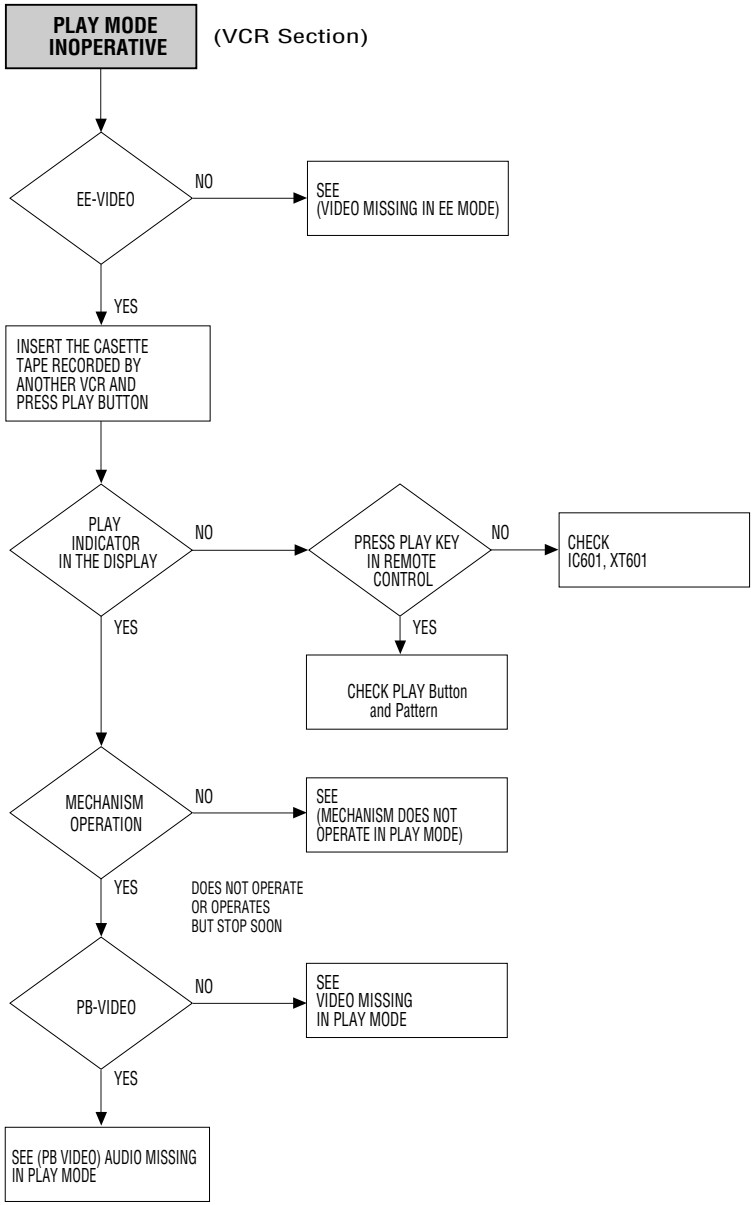
< Table 6-1 >

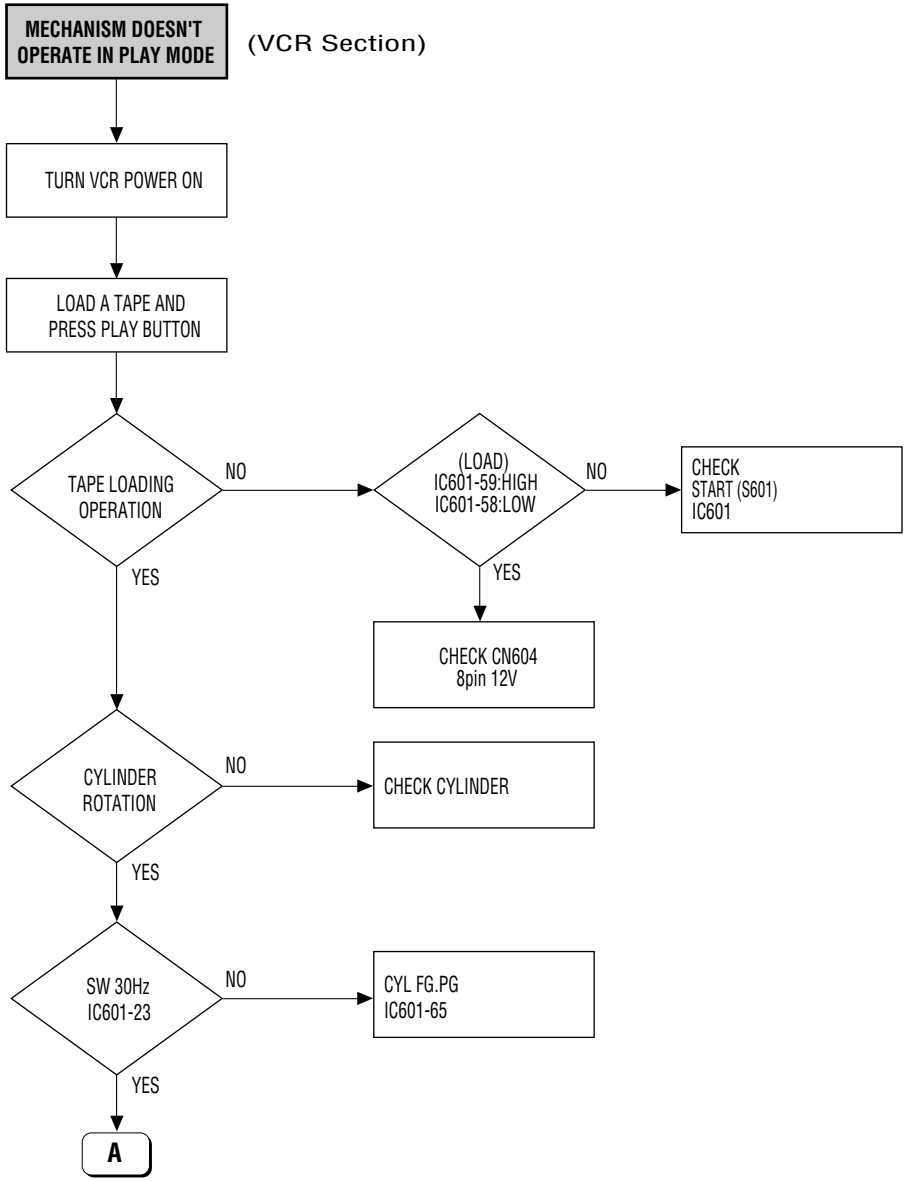
MODE	TORQUE g/cm	GAUGE
PB	42 ± 11	Cassette Torquemeter
RPS	145 ± 30	Cassette Torquemeter

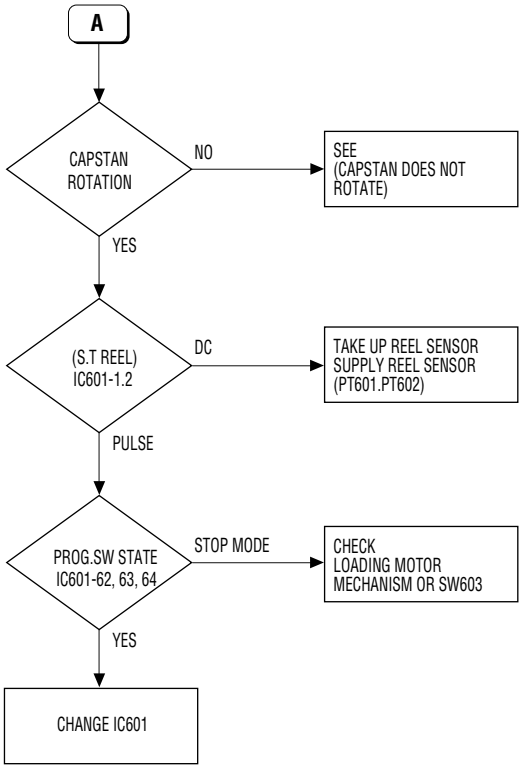
7. TROUBLESHOOTING

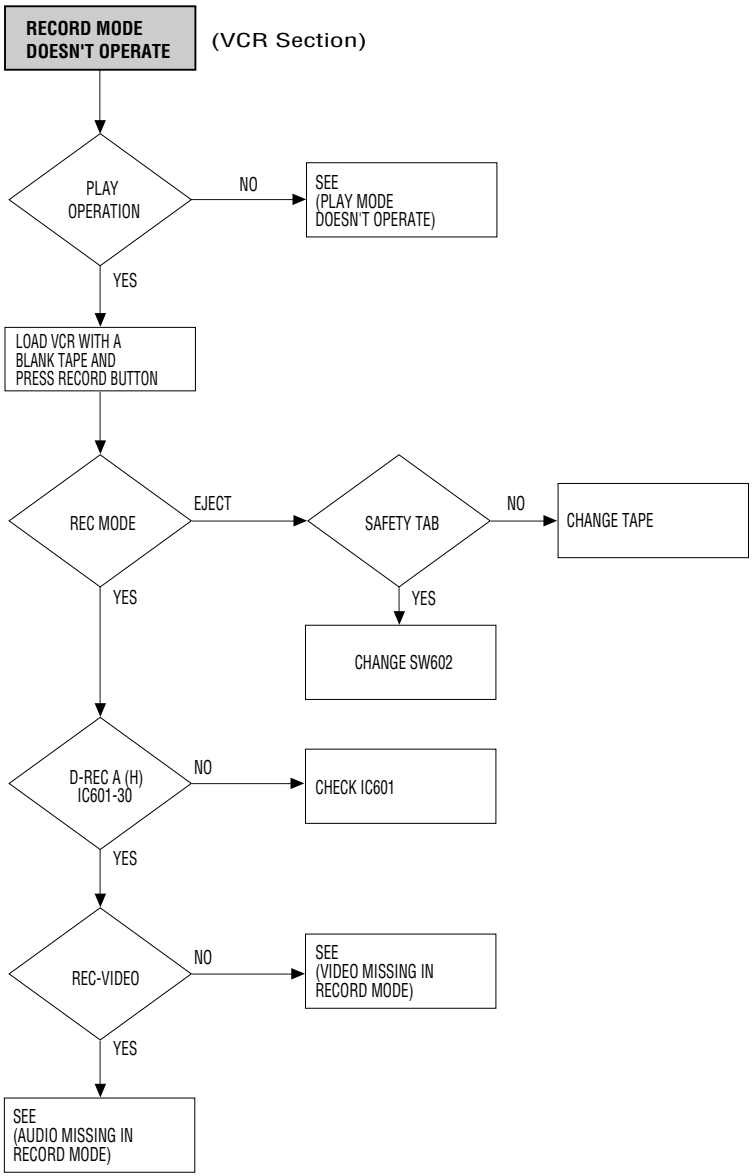

Key Operation or Remote Control Error
Is the measurement of power with in normal value?
NO
Check power and front connector
YES
XT601 14.318MHz oscillation is normal?
NO
Check the circuitry around the clock
YES
Check the circuitry around IC601 reset?
NO
Check the circuitry around IC601 reset
YES
Check the soldering around IC601 good?
NO
Check the soldering around the IC601
YES
Key operatious such as STOP,PLAY,OPEN are normal?
NO
Check the circuitry around the swith, check the condition of commmunication with Main Micom (IC801 83~86, VFD STB, CLOCK DATA-IN,DATA-OUT)
YES
End repairs
STOP,PLAY,OPEN Key operatious are normal?
YES
Change IC701

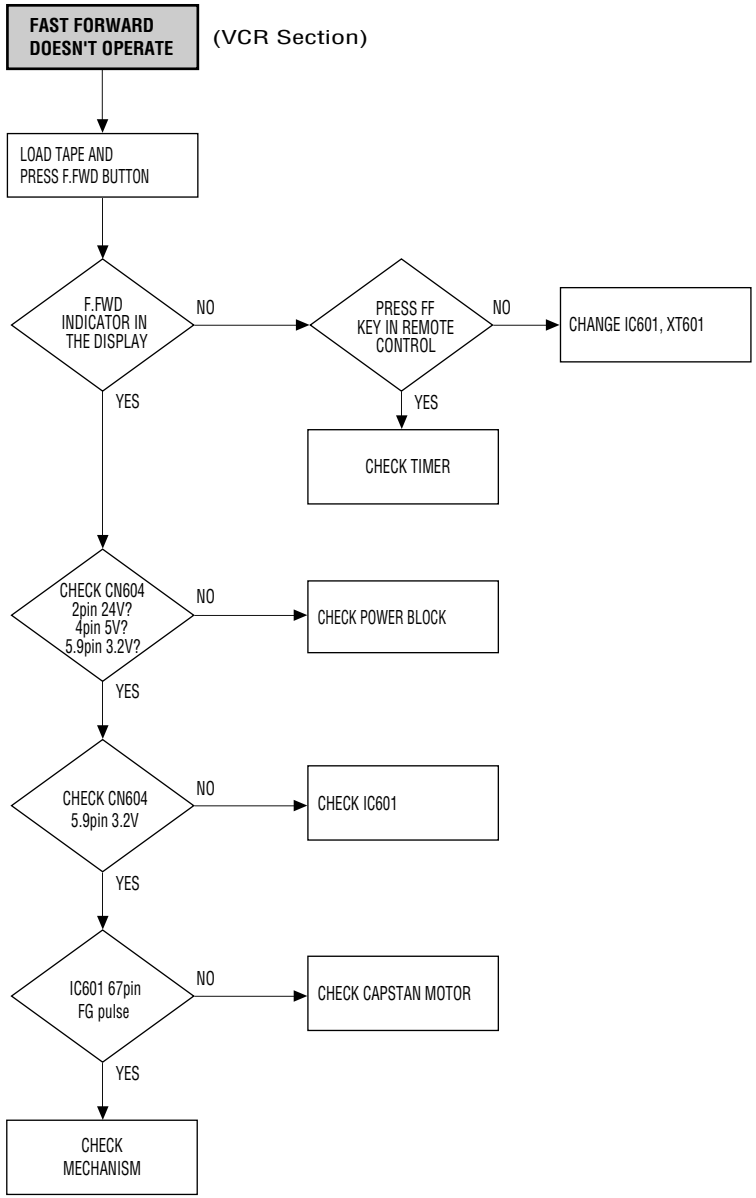


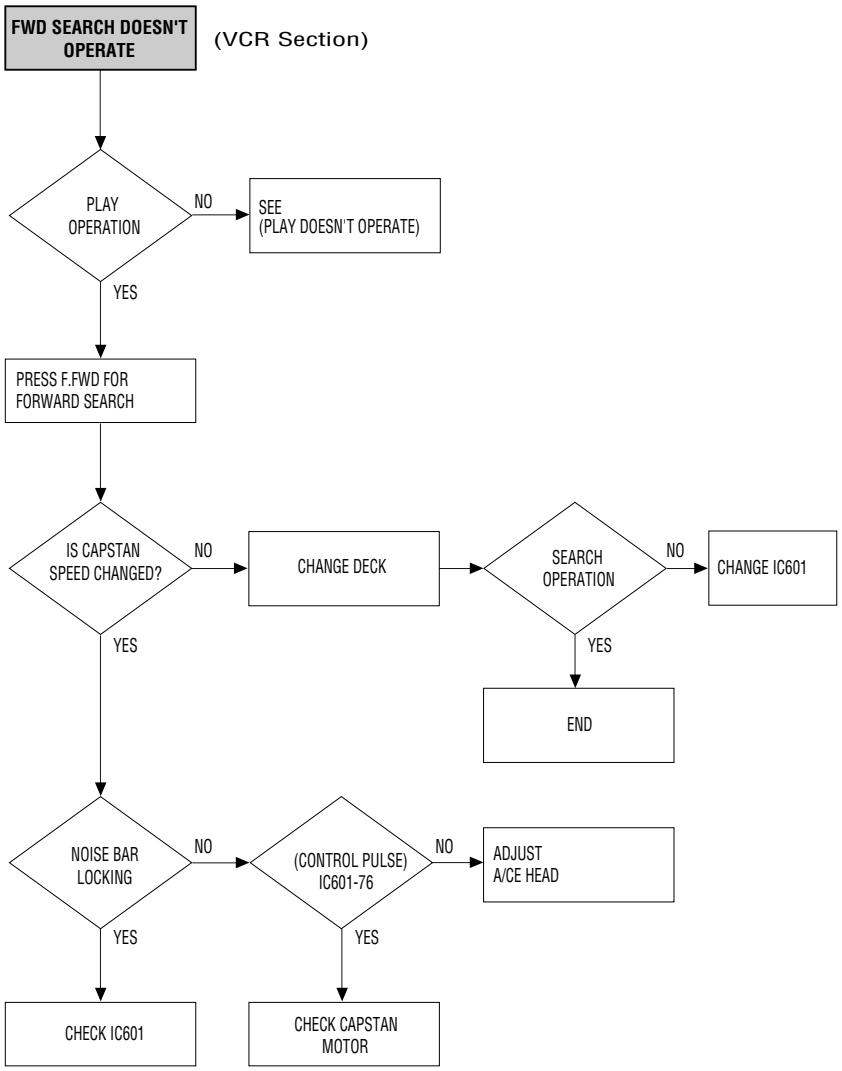

PLAY MODE INOPERATIVE
(VCR Section)
EE-VIDEO
NO
SEE (VIDEO MISSING IN EE MODE)
YES
INSERT THE CASETTE TAPE RECORDED BY ANOTHER VCR AND PRESS PLAY BUTTON
PLAY INDICATOR IN THE DISPLAY
NO
PRESS PLAY KEY IN REMOTE CONTROL
NO
CHECK IC601, XT601
YES
CHECK PLAY Button and Pattern
YES
MECHANISM OPERATION
NO
SEE (MECHANISM DOES NOT OPERATE IN PLAY MODE)
YES
DOES NOT OPERATE OR OPERATES BUT STOP SOON
PB-VIDEO
NO
SEE VIDEO MISSING IN PLAY MODE
YES
SEE (PB VIDEO) AUDIO MISSING IN PLAY MODE

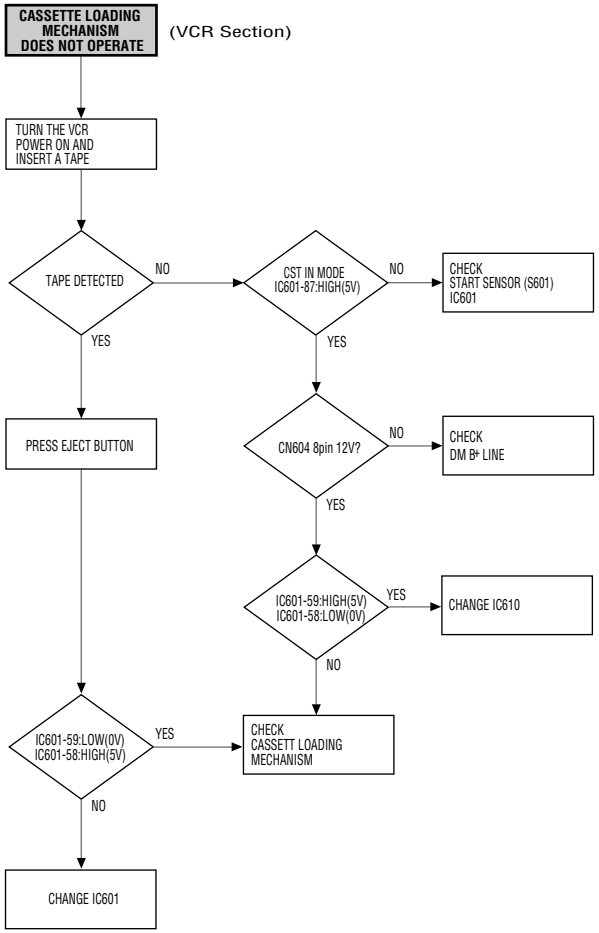

MECHANISM DOESN'T OPERATE IN PLAY MODE
(VCR Section)
TURN VCR POWER ON
LOAD A TAPE AND PRESS PLAY BUTTON
TAPE LOADING OPERATION
NO
(LOAD) IC601-59:HIGH IC601-58:LOW
NO
CHECK START (S601) IC601
YES
CHECK CN604 8pin 12V
YES
CYLINDER ROTATION
NO
CHECK CYLINDER
YES
SW 30Hz IC601-23
NO
CYL FG.PG IC601-65
YES
A

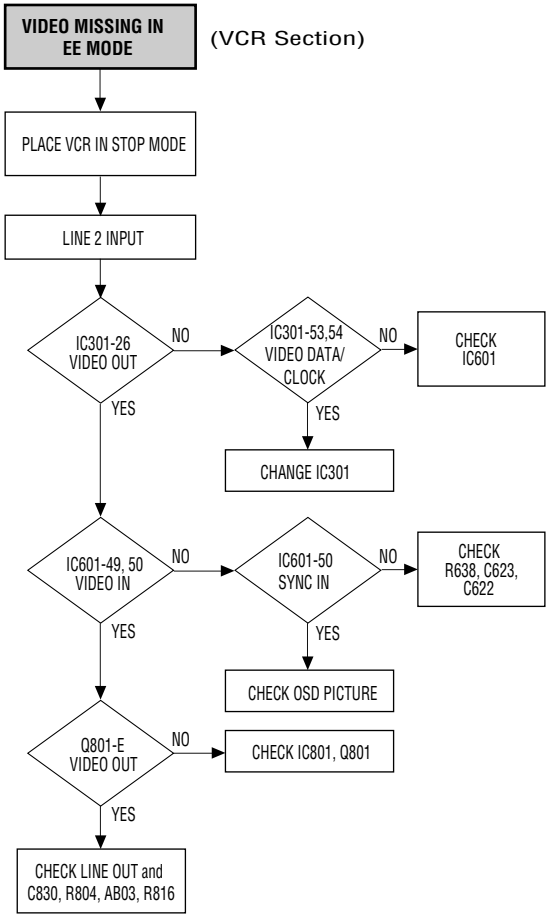

A
CAPSTAN ROTATION
NO
SEE (CAPSTAN DOES NOT ROTATE)
YES
(S.T REEL) IC601-1.2
DC
TAKE UP REEL SENSOR SUPPLY REEL SENSOR (PT601.PT602)
PULSE
PROG.SW STATE IC601-62, 63, 64
STOP MODE
CHECK LOADING MOTOR MECHANISM OR SW603
YES
CHANGE IC601

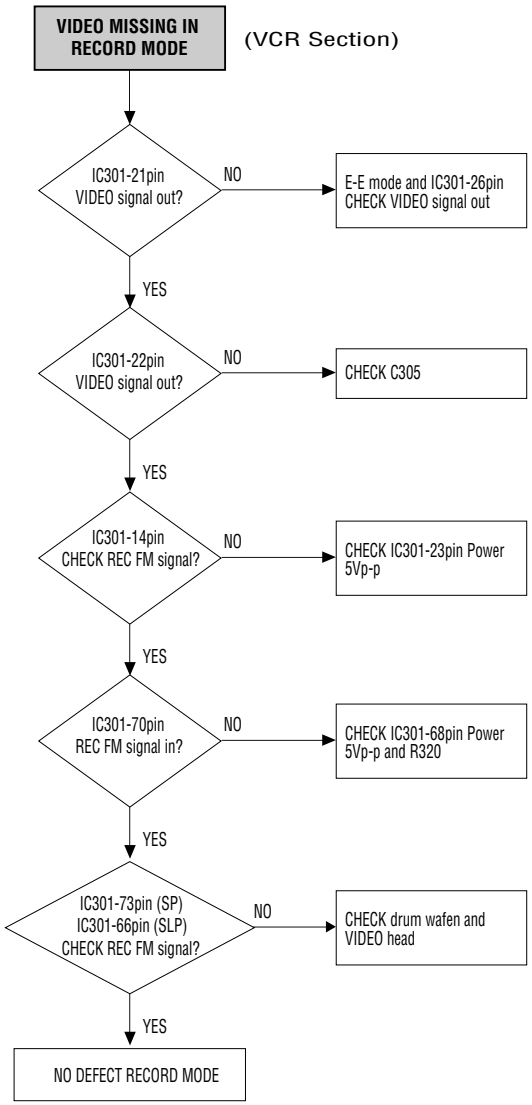

RECORD MODE DOESN'T OPERATE
(VCR Section)
PLAY OPERATION
NO
SEE (PLAY MODE DOESN'T OPERATE)
YES
LOAD VCR WITH A BLANK TAPE AND PRESS RECORD BUTTON
REC MODE
EJECT
SAFETY TAB
NO
CHANGE TAPE
YES
YES
CHANGE SW602
D-REC A (H) IC601-30
NO
CHECK IC601
YES
REC-VIDEO
NO
SEE (VIDEO MISSING IN RECORD MODE)
YES
SEE (AUDIO MISSING IN RECORD MODE)

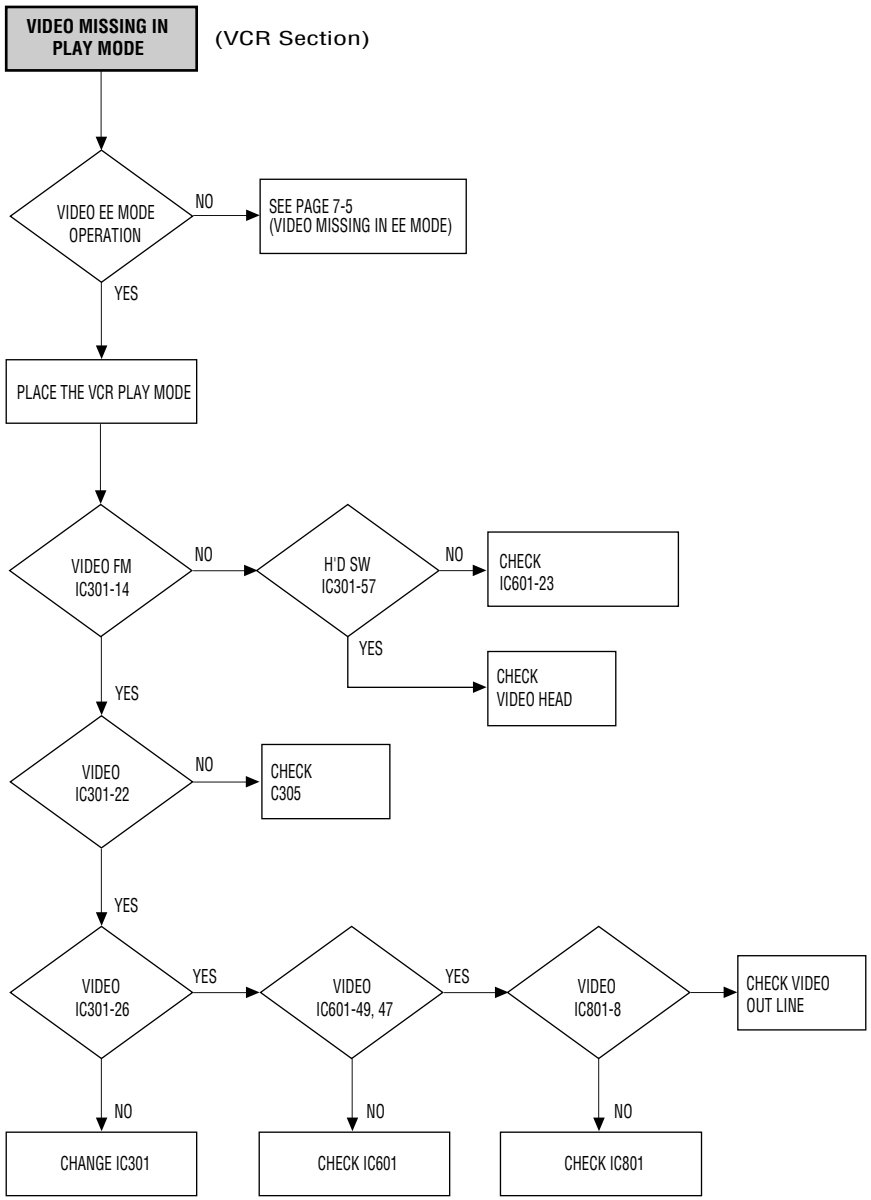

FAST FORWARD DOESN'T OPERATE
(VCR Section)
LOAD TAPE AND PRESS F.FWD BUTTON
F.FWD INDICATOR IN THE DISPLAY
NO
PRESS FF KEY IN REMOTE CONTROL
NO
CHANGE IC601, XT601
YES
YES
CHECK TIMER
CHECK CN604 2pin 24V? 4pin 5V? 5.9pin 3.2V?
NO
CHECK POWER BLOCK
YES
CHECK CN604 5.9pin 3.2V
NO
CHECK IC601
YES
IC601 67pin FG pulse
NO
CHECK CAPSTAN MOTOR
YES
CHECK MECHANISM

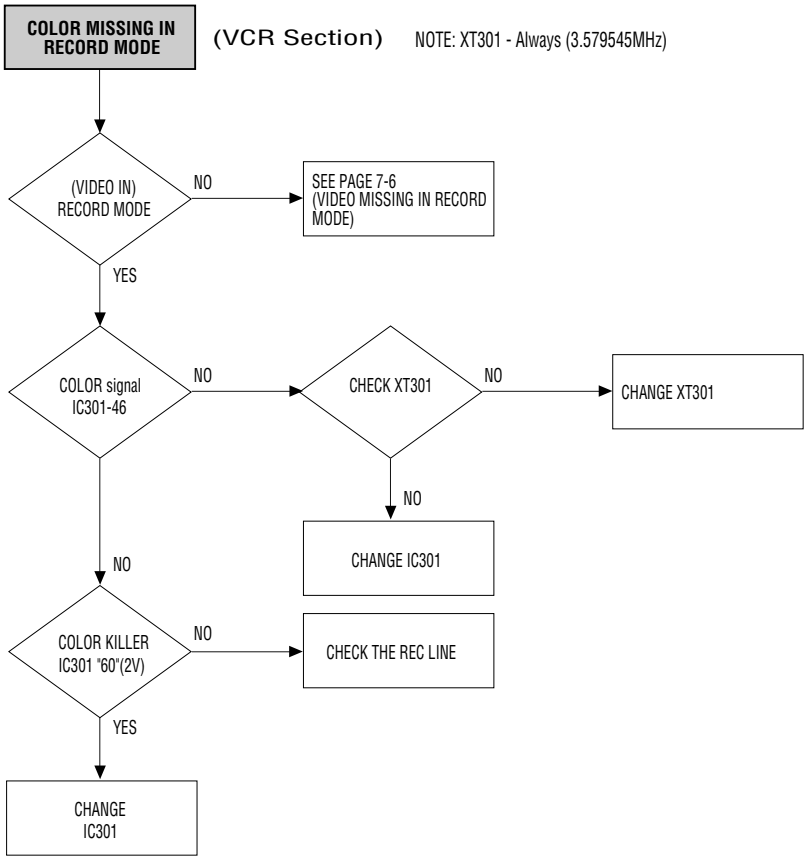

FWD SEARCH DOESN'T OPERATE
(VCR Section)
PLAY OPERATION
NO
SEE (PLAY DOESN'T OPERATE)
YES
PRESS F.FWD FOR FORWARD SEARCH
IS CAPSTAN SPEED CHANGED?
NO
CHANGE DECK
SEARCH OPERATION
NO
CHANGE IC601
YES
YES
END
NOISE BAR LOCKING
NO
(CONTROL PULSE) IC601-76
NO
ADJUST A/CE HEAD
YES
YES
CHECK IC601
CHECK CAPSTAN MOTOR

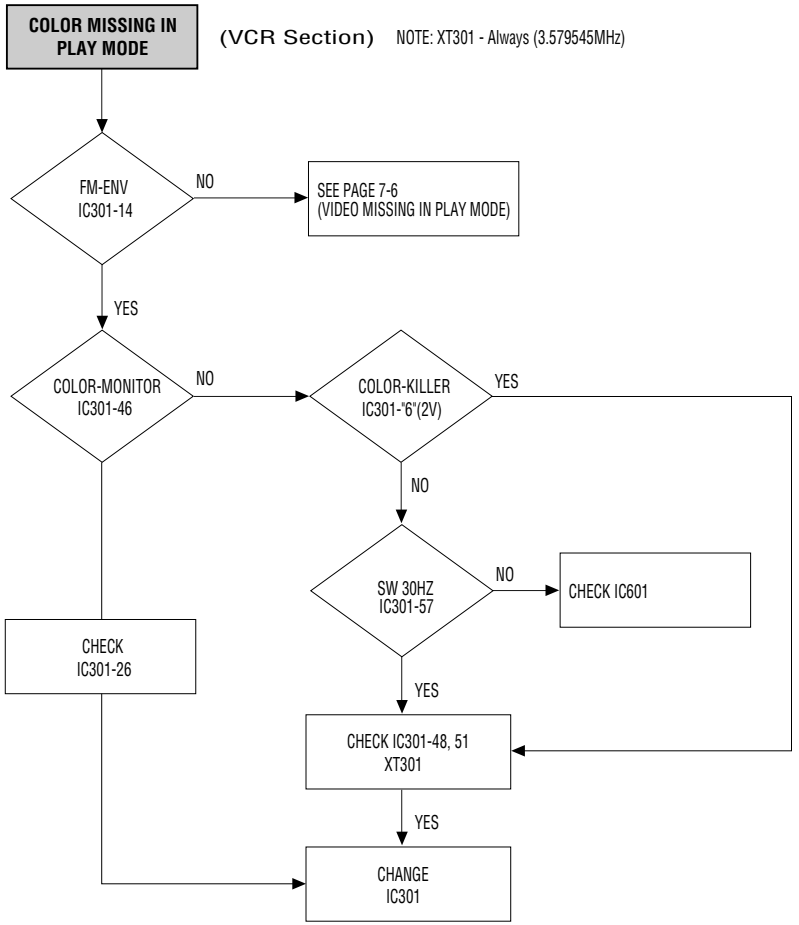

CASSETTE LOADING MECHANISM DOES NOT OPERATE
(VCR Section)
TURN THE VCR POWER ON AND INSERT A TAPE
TAPE DETECTED
NO
YES
CST IN MODE IC601-87:HIGH(5V)
NO
CHECK START SENSOR (S601) IC601
YES
PRESS EJECT BUTTON
CN604 8pin 12V?
NO
CHECK DM B+ LINE
YES
IC601-59:HIGH(5V) IC601-58:LOW(0V)
YES
CHANGE IC610
NO
IC601-59:LOW(0V) IC601-58:HIGH(5V)
YES
CHECK CASSETT LOADING MECHANISM
NO
CHANGE IC601


VIDEO MISSING IN EE MODE
(VCR Section)
PLACE VCR IN STOP MODE
LINE 2 INPUT
IC301-26 VIDEO OUT
NO
IC301-53,54 VIDEO DATA/ CLOCK
NO
CHECK IC601
YES
YES
CHANGE IC301
IC601-49, 50 VIDEO IN
NO
IC601-50 SYNC IN
NO
CHECK R638, C623, C622
YES
YES
CHECK OSD PICTURE
Q801-E VIDEO OUT
NO
CHECK IC801, Q801
YES
CHECK LINE OUT and C830, R804, AB03, R816

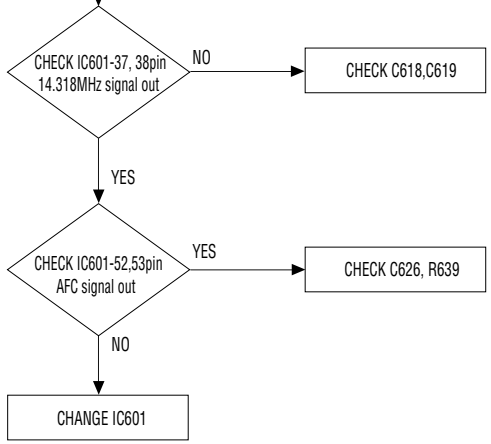

VIDEO MISSING IN RECORD MODE
(VCR Section)
IC301-21pin VIDEO signal out?
NO
E-E mode and IC301-26pin CHECK VIDEO signal out
YES
IC301-22pin VIDEO signal out?
NO
CHECK C305
YES
IC301-14pin CHECK REC FM signal?
NO
CHECK IC301-23pin Power 5Vp-p
YES
IC301-70pin REC FM signal in?
NO
CHECK IC301-68pin Power 5Vp-p and R320
YES
IC301-73pin (SP) IC301-66pin (SLP) CHECK REC FM signal?
NO
CHECK drum wafen and VIDEO head
YES
NO DEFECT RECORD MODE


VIDEO MISSING IN PLAY MODE
(VCR Section)
VIDEO EE MODE OPERATION
NO
SEE PAGE 7-5 (VIDEO MISSING IN EE MODE)
YES
PLACE THE VCR PLAY MODE
VIDEO FM IC301-14
NO
H'D SW IC301-57
NO
CHECK IC601-23
YES
CHECK VIDEO HEAD
YES
VIDEO IC301-22
NO
CHECK C305
YES
VIDEO IC301-26
YES
VIDEO IC601-49, 47
YES
VIDEO IC801-8
CHECK VIDEO OUT LINE
NO
CHANGE IC301
NO
CHECK IC601
NO
CHECK IC801

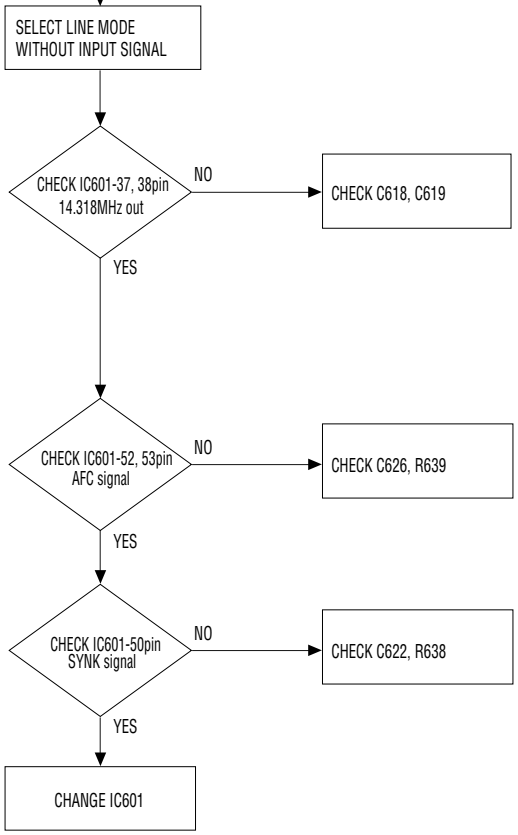

COLOR MISSING IN RECORD MODE
(VCR Section)
NOTE: XT301 - Always (3.579545MHz)
(VIDEO IN) RECORD MODE
NO
SEE PAGE 7-6 (VIDEO MISSING IN RECORD MODE)
YES
COLOR signal IC301-46
NO
CHECK XT301
NO
CHANGE XT301
NO
CHANGE IC301
NO
COLOR KILLER IC301 "60"(2V)
NO
CHECK THE REC LINE
YES
CHANGE IC301

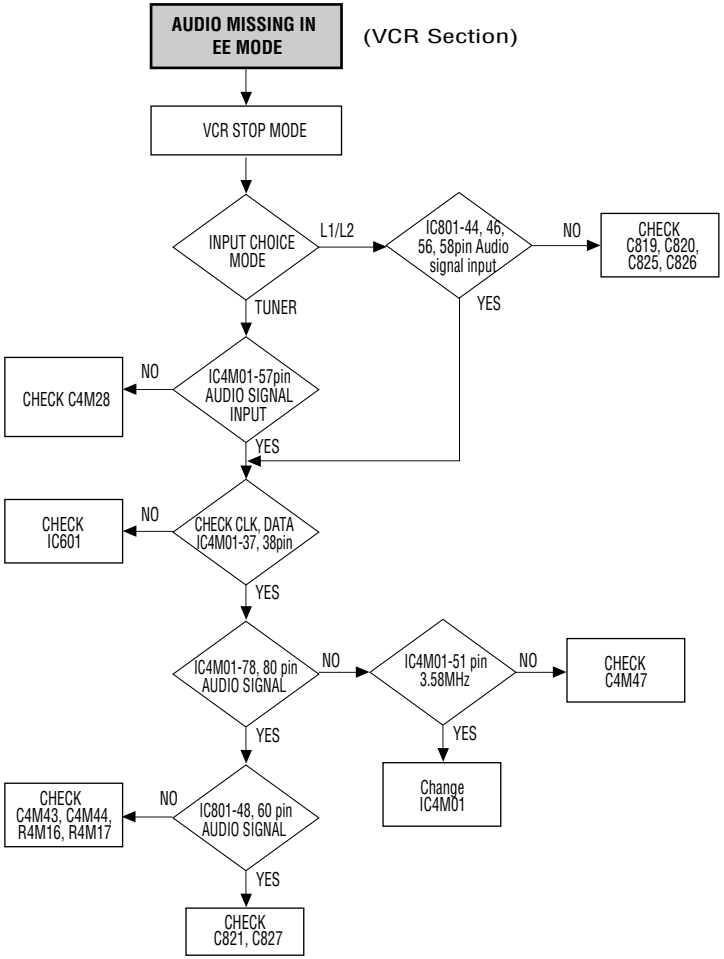

COLOR MISSING IN PLAY MODE
(VCR Section)
NOTE: XT301 - Always (3.579545MHz)
FM-ENV IC301-14
NO
SEE PAGE 7-6 (VIDEO MISSING IN PLAY MODE)
YES
COLOR-MONITOR IC301-46
NO
COLOR-KILLER IC301-"6"(2V)
YES
NO
SW 30HZ IC301-57
NO
CHECK IC601
YES
CHECK IC301
CHECK IC301-48, 51 XT301
YES
CHANGE IC301

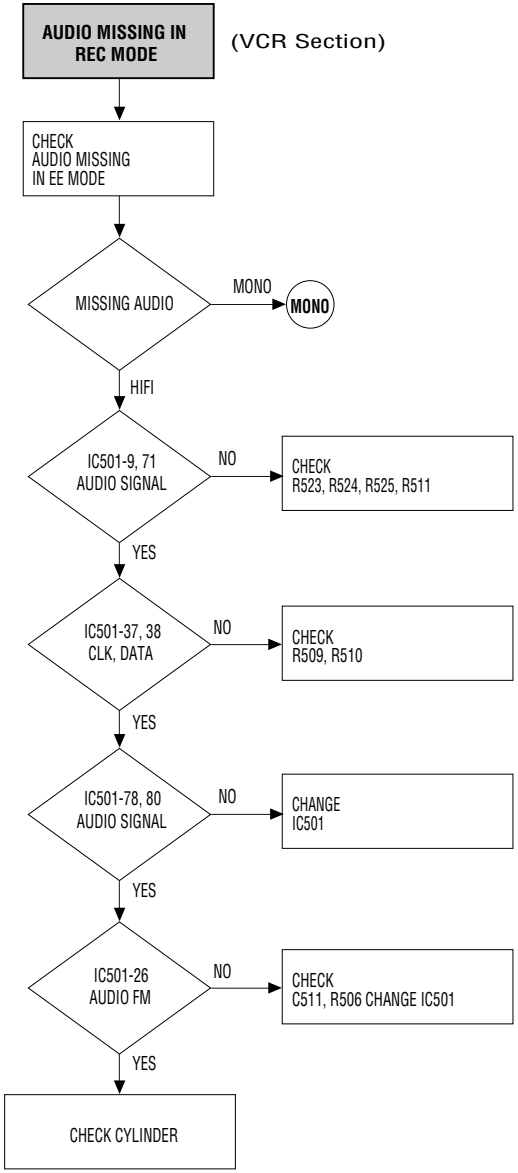
OSD PICTURE MISSING (VCR Section)

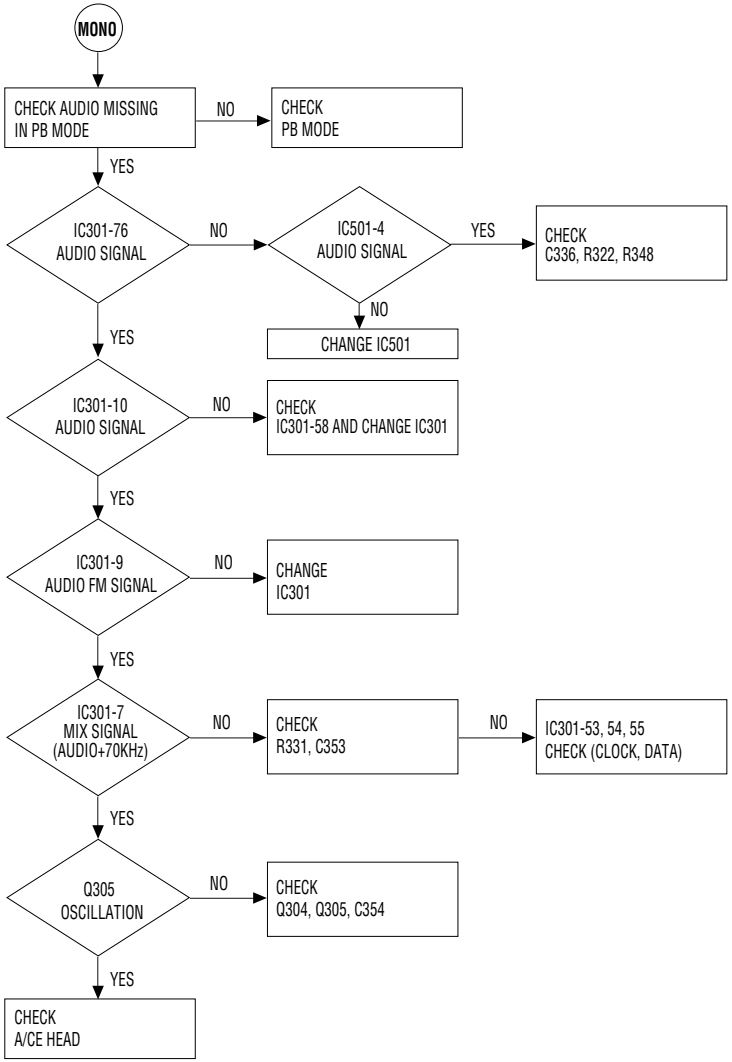


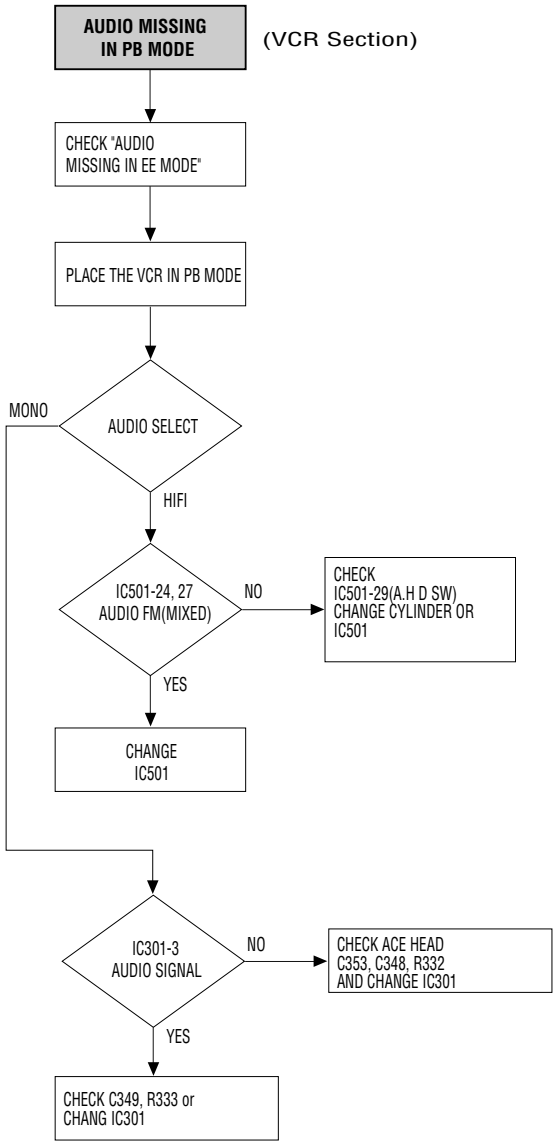
BLUE MISSING IN STOP MODE (VCR Section)

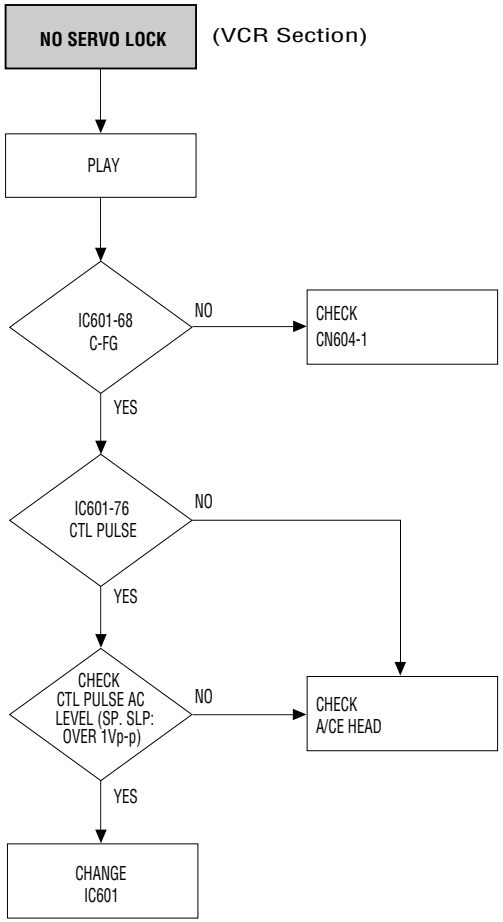


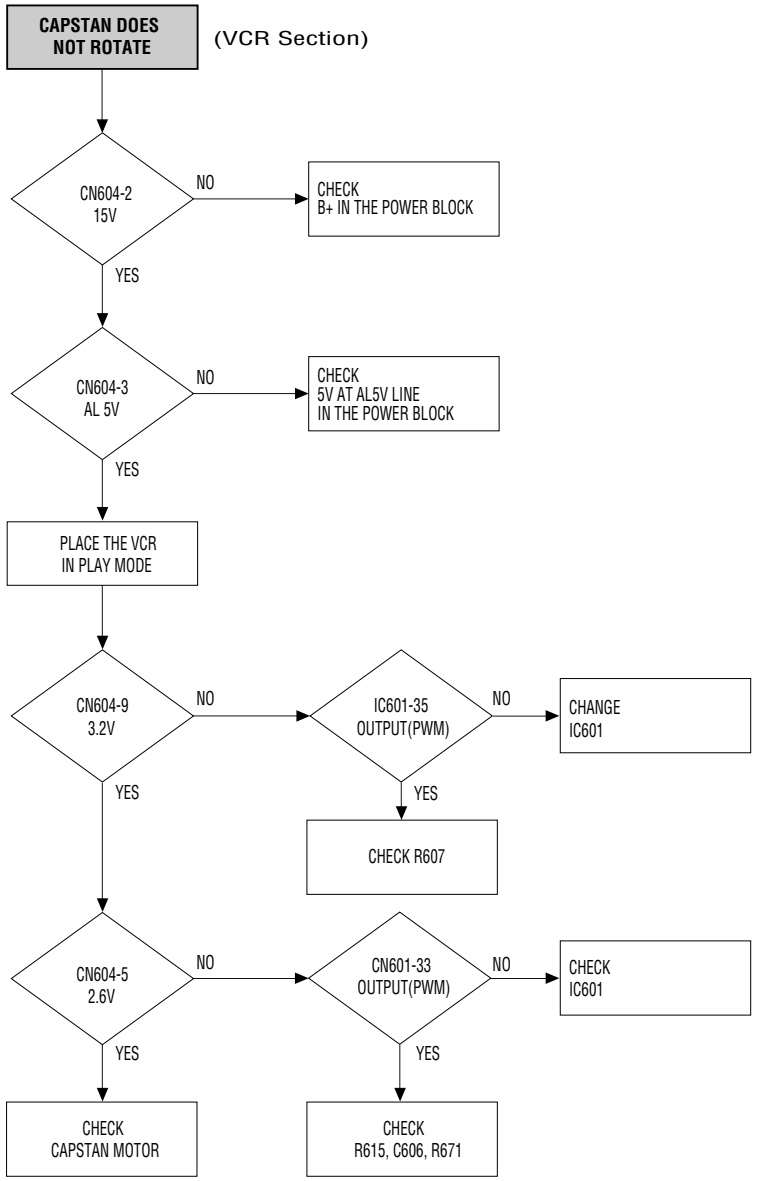

AUDIO MISSING IN EE MODE
(VCR Section)
VCR STOP MODE
INPUT CHOICE MODE
L1/L2
IC801-44, 46, 56, 58pin Audio signal input
NO
CHECK C819, C820, C825, C826
YES
TUNER
IC4M01-57pin AUDIO SIGNAL INPUT
NO
CHECK C4M28
YES
CHECK CLK, DATA IC4M01-37, 38pin
NO
CHECK IC601
YES
IC4M01-78, 80 pin AUDIO SIGNAL
NO
IC4M01-51 pin 3.58MHz
NO
CHECK C4M47
YES
YES
Change IC4M01
IC801-48, 60 pin AUDIO SIGNAL
NO
CHECK C4M43, C4M44, R4M16, R4M17
YES
CHECK C821, C827

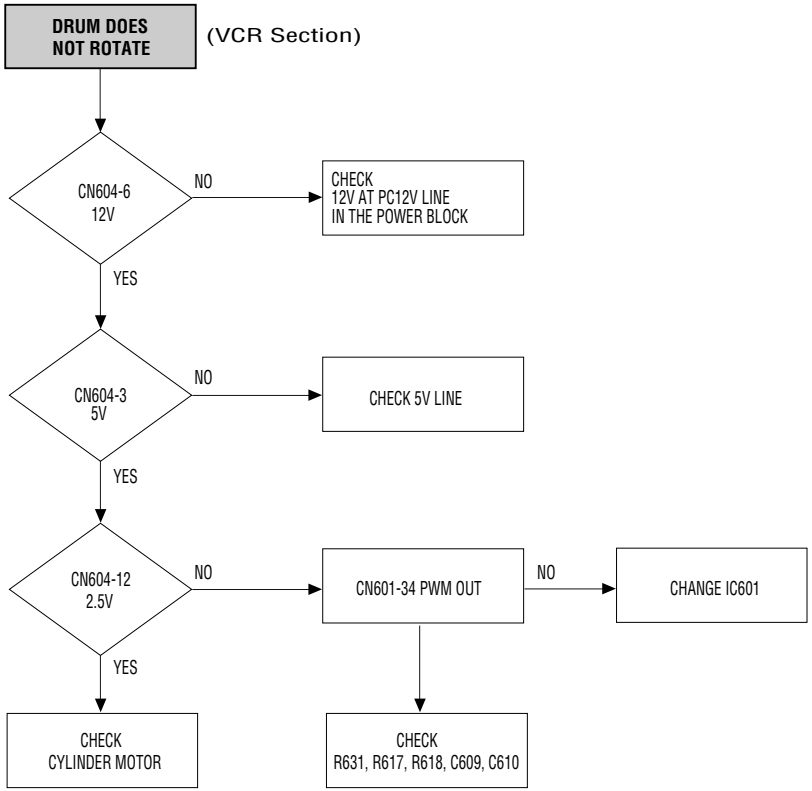

AUDIO MISSING IN REC MODE
(VCR Section)
CHECK AUDIO MISSING IN EE MODE
MISSING AUDIO
MONO
MONO
HIFI
IC501-9, 71 AUDIO SIGNAL
NO
CHECK R523, R524, R525, R511
YES
IC501-37, 38 CLK, DATA
NO
CHECK R509, R510
YES
IC501-78, 80 AUDIO SIGNAL
NO
CHANGE IC501
YES
IC501-26 AUDIO FM
NO
CHECK C511, R506 CHANGE IC501
YES
CHECK CYLINDER

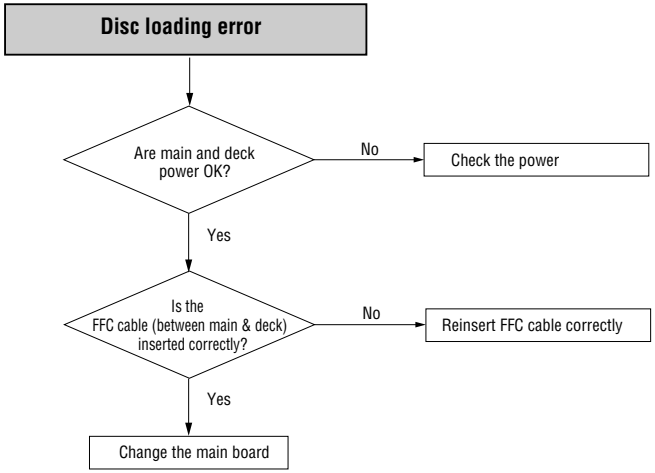

MONO
CHECK AUDIO MISSING IN PB MODE
NO
CHECK PB MODE
YES
IC301-76 AUDIO SIGNAL
NO
IC501-4 AUDIO SIGNAL
YES
CHECK C336, R322, R348
NO
CHANGE IC501
YES
IC301-10 AUDIO SIGNAL
NO
CHECK IC301-58 AND CHANGE IC301
YES
IC301-9 AUDIO FM SIGNAL
NO
CHANGE IC301
YES
IC301-7 MIX SIGNAL (AUDIO+70KHz)
NO
CHECK R331, C353
NO
IC301-53, 54, 55 CHECK (CLOCK, DATA)
YES
Q305 OSCILLATION
NO
CHECK Q304, Q305, C354
YES
CHECK A/CE HEAD

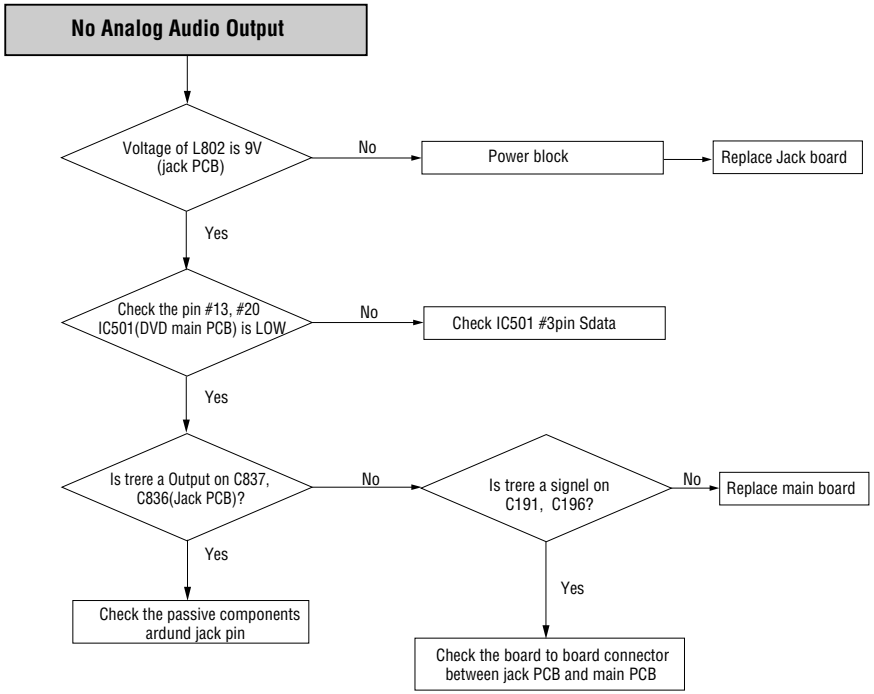

AUDIO MISSING IN PB MODE
(VCR Section)
CHECK "AUDIO MISSING IN EE MODE"
PLACE THE VCR IN PB MODE
MONO
AUDIO SELECT
HIFI
IC501-24, 27 AUDIO FM(MIXED)
NO
CHECK IC501-29(A.H D SW) CHANGE CYLINDER OR IC501
YES
CHANGE IC501
IC301-3 AUDIO SIGNAL
NO
CHECK ACE HEAD C353, C348, R332 AND CHANGE IC301
YES
CHECK C349, R333 or CHANG IC301

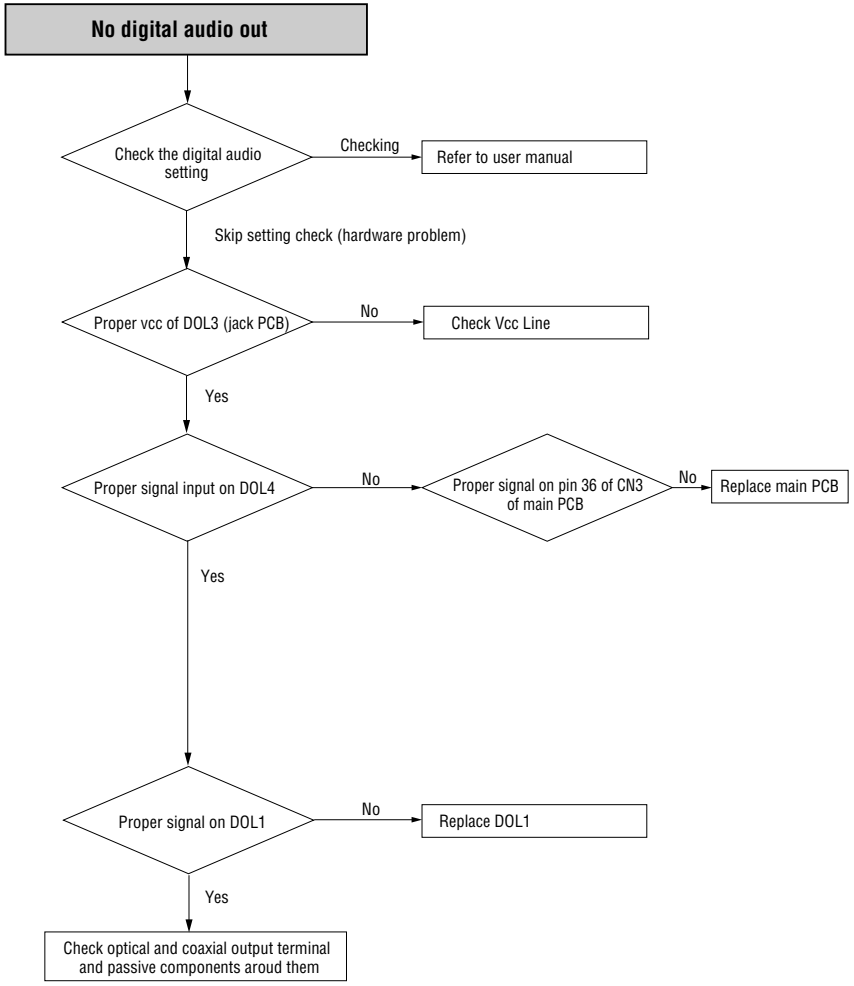

NO SERVO LOCK
(VCR Section)
PLAY
IC601-68
C-FG
NO
CHECK
CN604-1
YES
IC601-76
CTL PULSE
NO
YES
CHECK
CTL PULSE AC
LEVEL (SP. SLP:
OVER 1Vp-p)
NO
CHECK
A/CE HEAD
YES
CHANGE
IC601

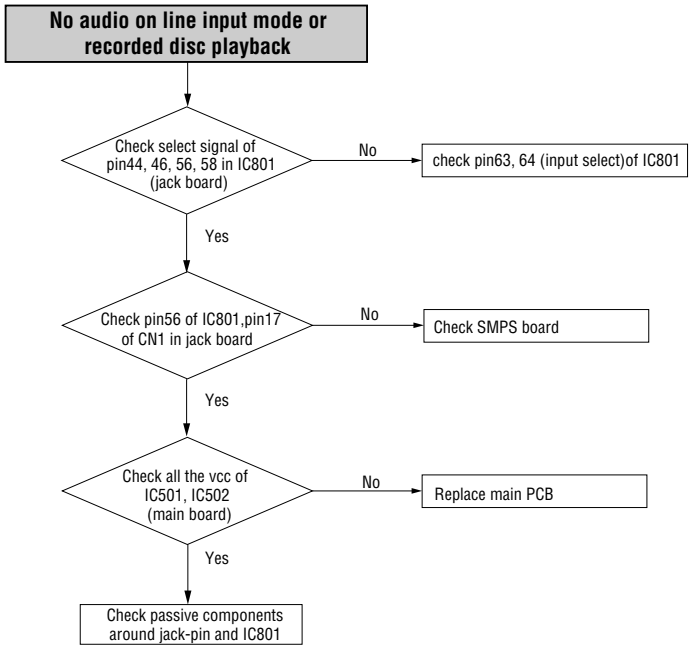

CAPSTAN DOES
NOT ROTATE
(VCR Section)
CN604-2
15V
NO
CHECK
B+ IN THE POWER BLOCK
YES
CN604-3
AL 5V
NO
CHECK
5V AT AL5V LINE
IN THE POWER BLOCK
YES
PLACE THE VCR
IN PLAY MODE
CN604-9
3.2V
NO
IC601-35
OUTPUT(PWM)
NO
CHANGE
IC601
YES
YES
CHECK R607
CN604-5
2.6V
NO
CN601-33
OUTPUT(PWM)
NO
CHECK
IC601
YES
YES
CHECK
CAPSTAN MOTOR
CHECK
R615, C606, R671

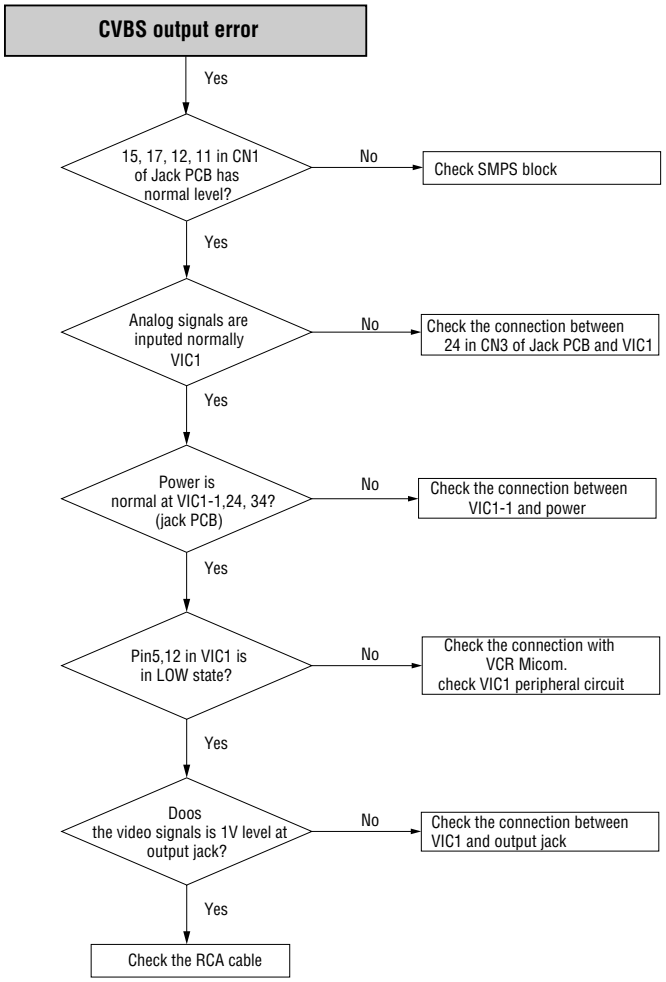

DRUM DOES NOT ROTATE
(VCR Section)
CN604-6 12V
NO
CHECK 12V AT PC12V LINE IN THE POWER BLOCK
YES
CN604-3 5V
NO
CHECK 5V LINE
YES
CN604-12 2.5V
NO
CN601-34 PWM OUT
NO
CHANGE IC601
YES
CHECK CYLINDER MOTOR
CHECK R631, R617, R618, C609, C610

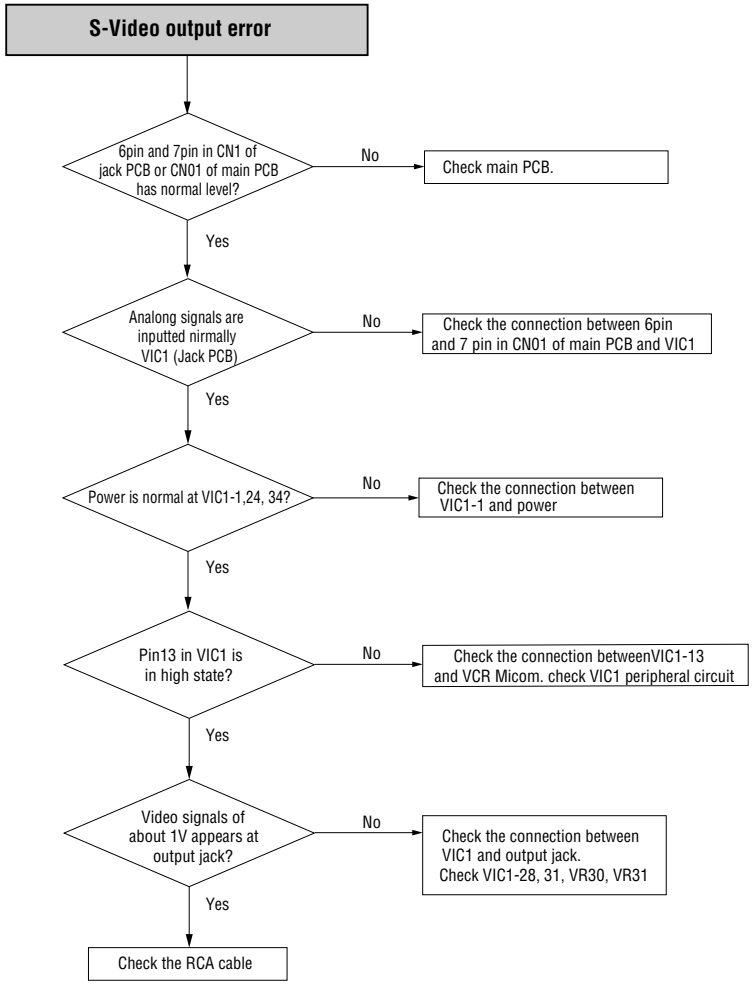

Disc loading error
Are main and deck power OK?
No
Check the power
Yes
Is the FFC cable (between main & deck) inserted correctly?
No
Reinsert FFC cable correctly
Yes
Change the main board

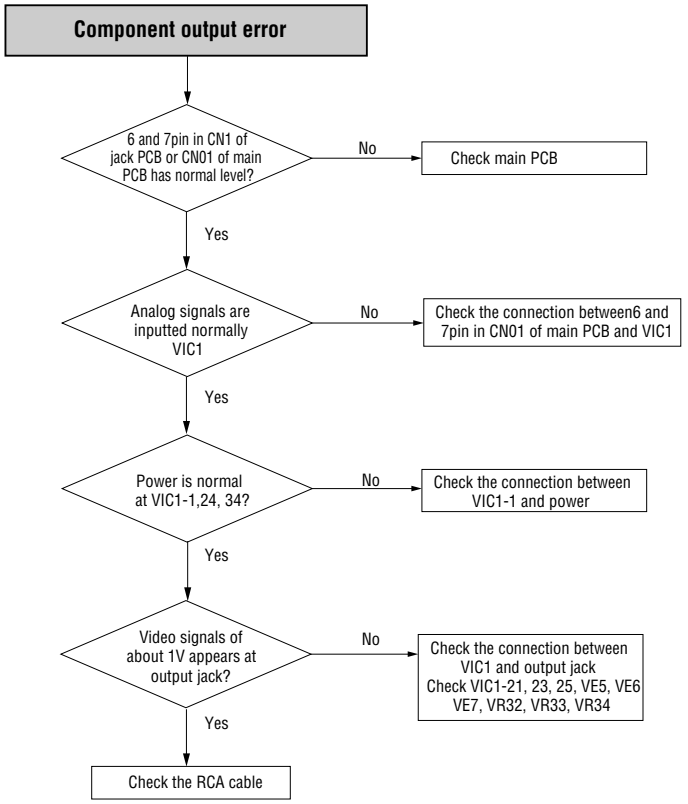

No Analog Audio Output
Voltage of L802 is 9V (jack PCB)
No
Power block
Replace Jack board
Yes
Check the pin #13, #20 IC501(DVD main PCB) is LOW
No
Check IC501 #3pin Sdata
Yes
Is trere a Output on C837, C836(Jack PCB)?
No
Is trere a signel on C191, C196?
No
Replace main board
Yes
Yes
Check the passive components ardund jack pin
Check the board to board connector between jack PCB and main PCB

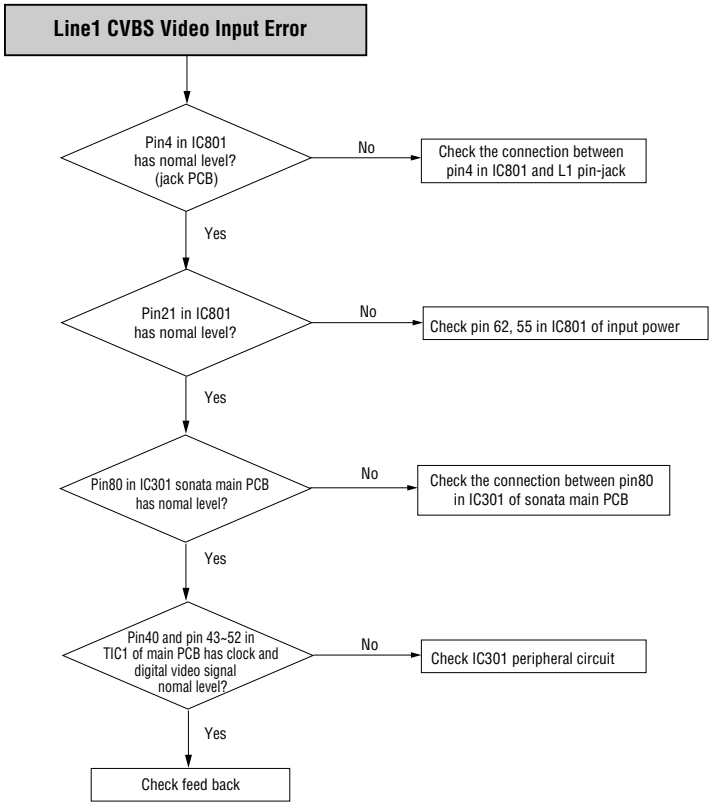

No digital audio out
Check the digital audio setting
Checking
Refer to user manual
Skip setting check (hardware problem)
Proper vcc of DOL3 (jack PCB)
No
Check Vcc Line
Yes
Proper signal input on DOL4
No
Proper signal on pin 36 of CN3 of main PCB
No
Replace main PCB
Yes
Proper signal on DOL1
No
Replace DOL1
Yes
Check optical and coaxial output terminal and passive components aroud them

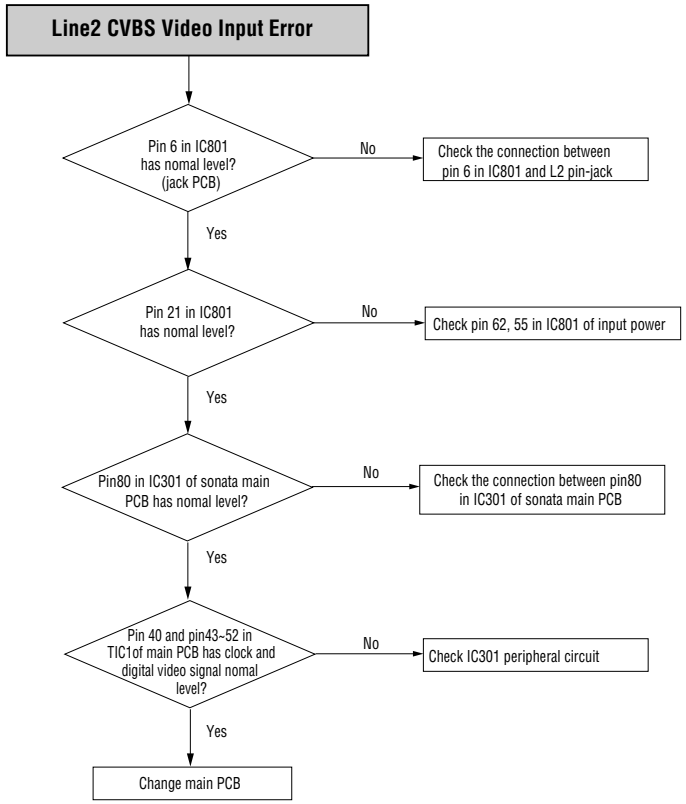

No audio on line input mode or recorded disc playback
Check select signal of pin44, 46, 56, 58 in IC801 (jack board)
No
check pin63, 64 (input select)of IC801
Yes
Check pin56 of IC801,pin17 of CN1 in jack board
No
Check SMPS board
Yes
Check all the vcc of IC501, IC502 (main board)
No
Replace main PCB
Yes
Check passive components around jack-pin and IC801

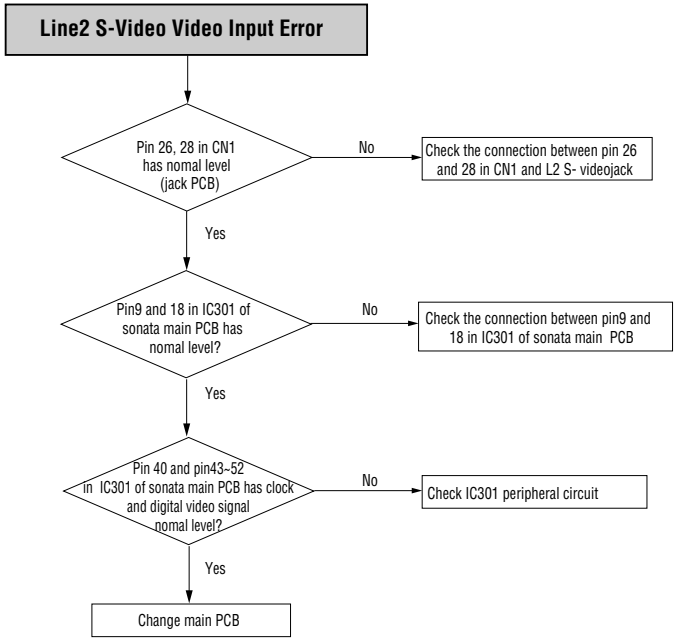

CVBS output error
Yes
15, 17, 12, 11 in CN1 of Jack PCB has normal level?
No
Check SMPS block
Yes
Analog signals are inputed normally VIC1
No
Check the connection between 24 in CN3 of Jack PCB and VIC1
Yes
Power is normal at VIC1-1,24, 34? (jack PCB)
No
Check the connection between VIC1-1 and power
Yes
Pin5,12 in VIC1 is in LOW state?
No
Check the connection with VCR Micom. check VIC1 peripheral circuit
Yes
Doos the video signals is 1V level at output jack?
No
Check the connection between VIC1 and output jack
Yes
Check the RCA cable


S-Video output error
6pin and 7pin in CN1 of jack PCB or CN01 of main PCB has normal level?
No
Check main PCB.
Yes
Analong signals are inputted nirmally VIC1 (Jack PCB)
No
Check the connection between 6pin and 7 pin in CN01 of main PCB and VIC1
Yes
Power is normal at VIC1-1,24, 34?
No
Check the connection between VIC1-1 and power
Yes
Pin13 in VIC1 is in high state?
No
Check the connection betweenVIC1-13 and VCR Micom. check VIC1 peripheral circuit
Yes
Video signals of about 1V appears at output jack?
No
Check the connection between VIC1 and output jack. Check VIC1-28, 31, VR30, VR31
Yes
Check the RCA cable


Component output error
6 and 7pin in CN1 of jack PCB or CN01 of main PCB has normal level?
No
Check main PCB
Yes
Analog signals are inputted normally VIC1
No
Check the connection between6 and 7pin in CN01 of main PCB and VIC1
Yes
Power is normal at VIC1-1,24, 34?
No
Check the connection between VIC1-1 and power
Yes
Video signals of about 1V appears at output jack?
No
Check the connection between VIC1 and output jack Check VIC1-21, 23, 25, VE5, VE6 VE7, VR32, VR33, VR34
Yes
Check the RCA cable


Line1 CVBS Video Input Error
Pin4 in IC801 has nomal level? (jack PCB)
No
Check the connection between pin4 in IC801 and L1 pin-jack
Yes
Pin21 in IC801 has nomal level?
No
Check pin 62, 55 in IC801 of input power
Yes
Pin80 in IC301 sonata main PCB has nomal level?
No
Check the connection between pin80 in IC301 of sonata main PCB
Yes
Pin40 and pin 43~52 in TIC1 of main PCB has clock and digital video signal nomal level?
No
Check IC301 peripheral circuit
Yes
Check feed back


Line2 CVBS Video Input Error
Pin 6 in IC801 has nomal level? (jack PCB)
No
Check the connection between pin 6 in IC801 and L2 pin-jack
Yes
Pin 21 in IC801 has nomal level?
No
Check pin 62, 55 in IC801 of input power
Yes
Pin80 in IC301 of sonata main PCB has nomal level?
No
Check the connection between pin80 in IC301 of sonata main PCB
Yes
Pin 40 and pin43~52 in TIC1of main PCB has clock and digital video signal nomal level?
No
Check IC301 peripheral circuit
Yes
Change main PCB


Line2 S-Video Video Input Error
Pin 26, 28 in CN1 has nomal level (jack PCB)
No
Check the connection between pin 26 and 28 in CN1 and L2 S- videojack
Yes
Pin9 and 18 in IC301 of sonata main PCB has nomal level?
No
Check the connection between pin9 and 18 in IC301 of sonata main PCB
Yes
Pin 40 and pin43~52 in IC301 of sonata main PCB has clock and digital video signal nomal level?
No
Check IC301 peripheral circuit
Yes
Change main PCB

8. REPAIR PARTS LIST

8-1 Exploded Views ---------- 8-2

8-1-1 Cabinet Assembly ---------- 8-2

8-1-2 VCR Mechanical Parts (Top Side) ---------- 8-3

8-1-3 VCR Mechanical Parts (Bottom Side) ---------- 8-4

8-2 Electrical Parts List ---------- 8-5

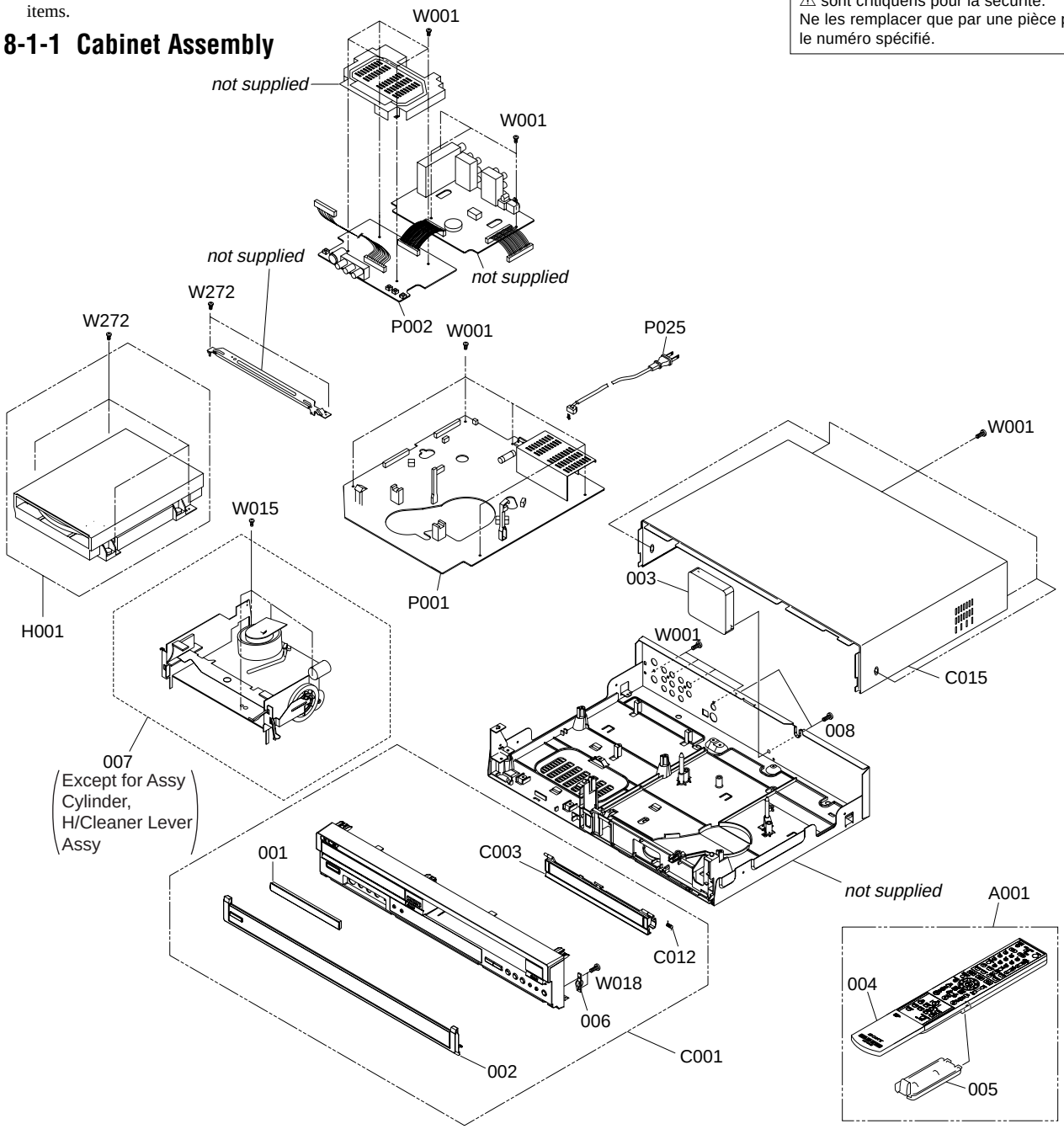
8-1 EXPLODED VIEWS

NOTE:

- -XX, -X mean standardized parts, so they may have some differences from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.
Les composants identifiés par une marque ⚠ sont critiquens pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

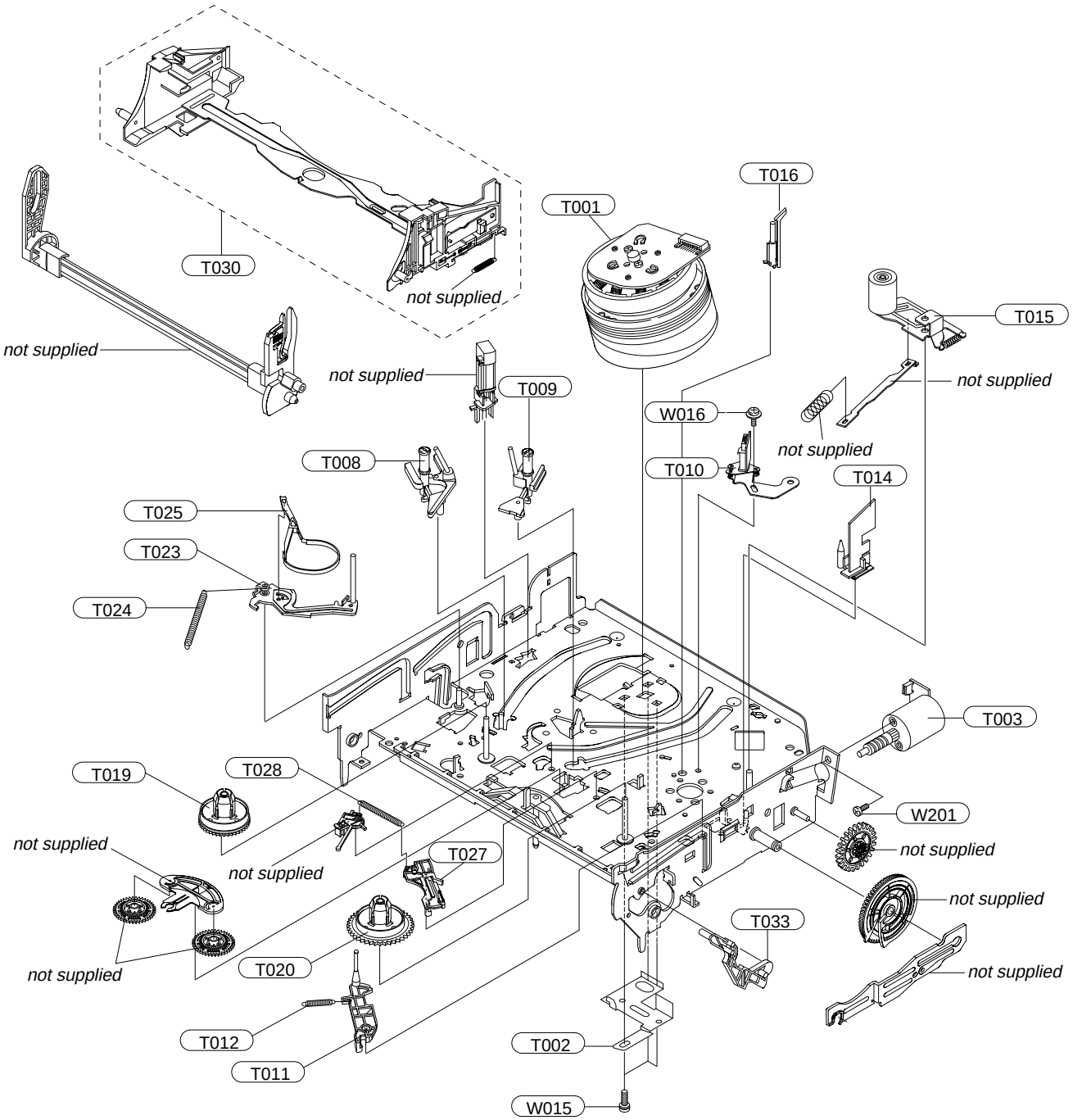
8-1-1 Cabinet Assembly



Ref. No.	Part No.	Description	Remarks
001	9-885-070-06	DOOR-TRAY	
002	9-885-070-07	DOOR-FRONT	
003	9-885-069-76	FAN-DC CF-12715S	
004	2-187-643-11	DOOR (RW2), SLIDE (for RMT-V505)	
005	3-071-119-91	COVER, BATTERY (for RMT-V505)	
006	9-885-070-10	ASSY-DAMPER	
007	9-885-063-62	ASSY DECK	
008	9-885-069-91	SCREW-SPECIAL	
A001	1-479-094-11	REMOTE COMMANDER (RMT-V505)	
C001	9-885-070-09	ASSY-PANEL FRONT	
C003	9-885-070-05	DOOR-CASSETTE	

Ref. No.	Part No.	Description	Remarks
C012	3-080-528-01	SPRING ETC	
C015	9-885-070-04	CABINET-TOP	
H001	9-885-070-08	ASSY-DVDR DECK	
P001	9-885-069-99	ASSY PCB-MAIN	
P002	9-885-069-97	ASSY PCB-DIGITAL	
⚠ P025	1-824-674-11	POWER CORD EP2 SPT-2	
W001	9-885-069-84	SCREW-TAPTITE BLK SWCH101	
W015	9-885-069-89	SCREW-MACHINE ZPC (YEL)	
W018	9-885-069-87	SCREW-TAPTITE PH ZPC (YEL)	
W272	9-885-069-88	SCREW-TAPTITE ZPC (WHT)	

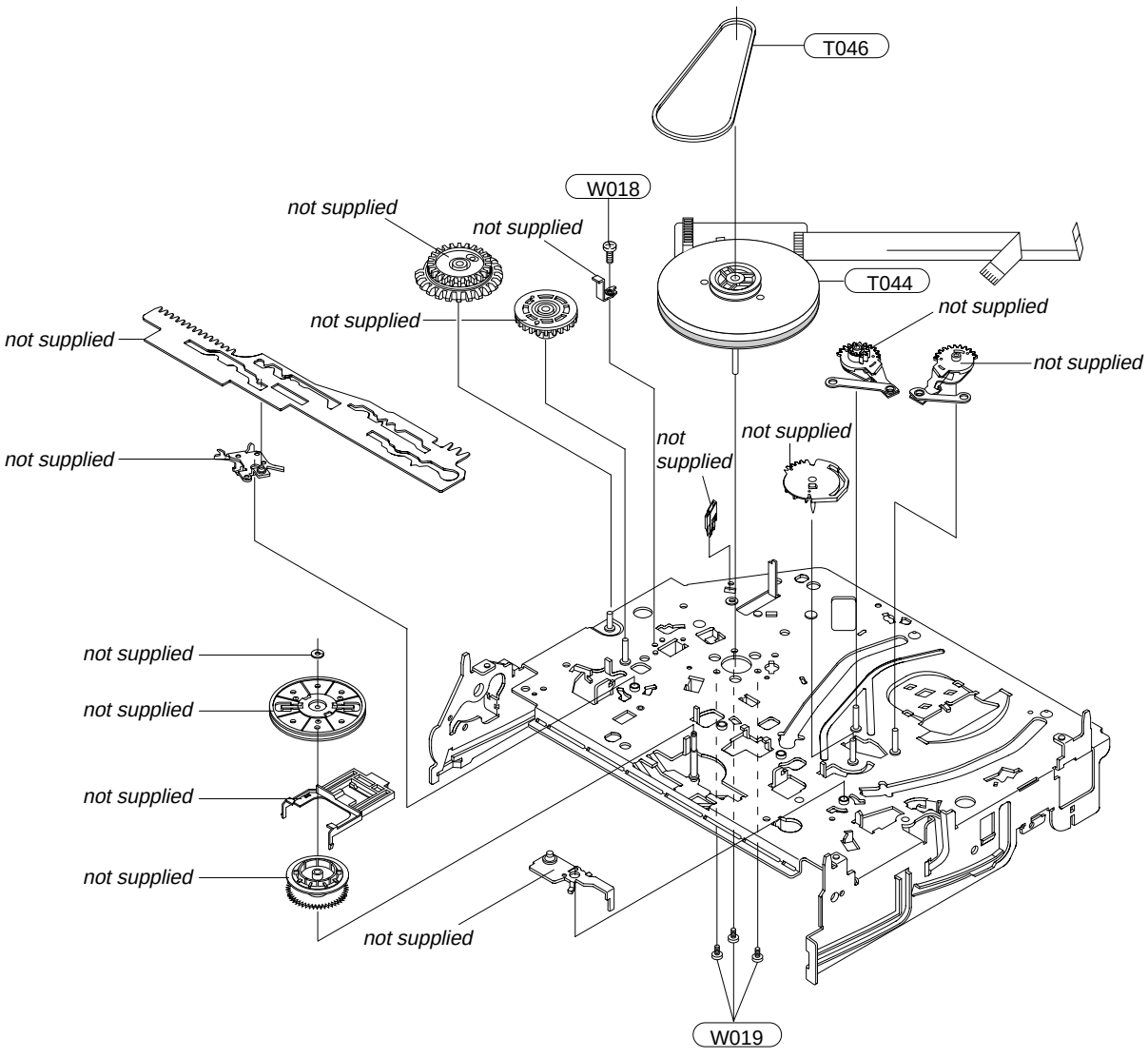
8-1-2 VCR Mechanical Parts (Top Side)



Ref. No.	Part No.	Description	Remarks
T001	9-885-069-98	ASSY-CYLINDER	
T002	9-885-061-12	PLATE-GROUND DECK	
T003	1-763-836-11	LOADING ASSY, MOTOR	
T008	3-079-347-01	SLIDER-SUPPLY ASSY	
T009	3-079-346-01	SLIDER-TAKE UP ASSY	
T010	3-075-241-01	ASSY ACE HEAD	
T011	9-885-053-44	LEVER-#9 GUIDE	
T012	3-067-780-01	SPRING-#9 GUIDE	
T014	9-885-061-11	LEVER-FL DOOR	
T015	9-885-053-45	UNIT PINCH ASSY	
T016	9-885-061-14	POST-#8 GUIDE ASSY	
T019	3-075-046-01	DISK S REEL	

Ref. No.	Part No.	Description	Remarks
T020	3-075-047-01	DISK T REEL	
T023	3-067-781-01	LEVER-TENSION	
T024	3-067-782-01	SPRING-TENSION LEVER	
T025	3-067-783-01	BAND-BREAK	
T027	3-067-785-01	LEVER-T. BRAKE	
T028	3-067-786-01	SPRING-BRAKE	
T030	9-885-061-15	ASSY-HOLDER FL CASSETTE	
T033	3-067-789-01	GUIDE-CASS. DOOR	
W015	9-885-069-89	SCREW-MACHINE ZPC (YEL)	
W016	9-885-069-90	SCREW-TAPTITE ZPC (YEL)	
W201	9-885-069-81	SCREW-MACHINE ZPC (YEL)	

8-1-3 VCR Mechanical Parts (Bottom Side)



Ref. No.	Part No.	Description	Remarks
T044	9-885-063-61	MOTOR CAPSTAN	
T046	3-067-790-01	BELT-PULLEY	

Ref. No.	Part No.	Description	Remarks
W018	9-885-069-87	SCREW-TAPTITE PH ZPC (YEL)	
W019	9-885-069-82	SCREW-TAPTITE ZPC (YEL) SW	

8-2 ELECTRICAL PARTS LIST

NOTE:
- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, and -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms.
  METAL: metal-film resistor
  METAL OXIDE: Metal Oxide-film resistor
  F: nonflammable
- Not all of the parts are listed.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u: μ, for example:
  uA...: μA... , uPA... , μPA... ,
  uPB... , μPB... , uPC... , μPC... ,
  uPD..., μPD...
- CAPACITORS:
  uF: μF
- COILS
  uH: μH

When indicating parts by reference number, please include the board name.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiquens pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

Ref. No.	Part No.	Description	Remarks
		DVD MAIN BOARD	
		**********	
	9-885-069-97	ASSY PCB-DIGITAL	
		< IC >	
IC101	9-885-070-63	IC CS92686 (ENCODER/DECODER)	
IC102	9-885-070-51	IC 416S1120 (DRAM)	
IC103	9-885-070-51	IC 416S1120 (DRAM)	
IC104	9-885-070-51	IC 416S1120 (DRAM)	
IC105	9-885-070-51	IC 416S1120 (DRAM)	
IC201	9-885-070-62	IC CS98201 (DECODER)	
IC202	9-885-070-52	IC 4S641632 (DRAM)	
IC203		IC (FLASH MEMORY)	
IC204	9-885-070-52	IC 4S641632 (DRAM)	
IC205	9-885-070-50	IC 524L50X51 (EEPROM)	
IC206	9-885-070-54	IC (POSI ADJUST REG)	
IC301	9-885-070-61	IC TVP5146PFP (PAL/NTSC DECODER)	
IC302	1-805-039-11	IC M74HCU04	
IC303	9-885-070-45	IC 74VHCT125A (CMOS LOGIC)	
IC401	9-885-070-64	IC TSB41AB1-PAP (DATA COMM/GEN)	
IC501	9-885-070-46	IC CS4391 (D/A CONVERTER)	
IC502	9-885-070-47	IC (A/D CONVERTER)	
IC503	9-885-070-53	IC 4560 (OP AMP)	
IC504	9-885-070-53	IC 4560 (OP AMP)	
U201	9-885-070-45	IC 74VHCT125A (CMOS LOGIC)	
		< TRANSISTOR >	
QS01	9-885-070-29	TR-SMALL SIGNAL	KSA812
QS02	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L
QS03	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L
		< SWITCH >	
SW1	9-885-069-77	SWITCH-TACT DC12V	
SW3	9-885-069-77	SWITCH-TACT DC12V	
SW4	9-885-069-77	SWITCH-TACT DC12V	
		< VIBRATOR >	
X1	9-885-070-70	CRYSTAL-SMD (24.576MHz)	
X2	9-885-069-74	CRYSTAL-SMD (14.31818MHz)	
X3	9-885-070-69	CRYSTAL-UNIT (27MHZ)	

Ref. No.	Part No.	Description	Remarks
		FUNCTION TIMER BOARD	
		**********	
		< VFD DISPLAY >	
DT701	9-885-070-01	VFD DISPLAY HNV-10SM40	
		< LED >	
LD701	9-885-070-41	LED INVERTER (COPY VCR→DVD)	
LD702	9-885-070-41	LED INVERTER (COPY DVD→VCR)	
		< MODULE >	
RM701	9-885-069-95	MODULE REMOCON TSOP2240RF1	
		< SWITCH >	
SW703	9-885-069-77	SWITCH-TACT (PAUSE)	
SW705	9-885-069-77	SWITCH-TACT (VIDEO)	
SW706	9-885-069-77	SWITCH-TACT (COPYD2V)	
SW707	9-885-069-77	SWITCH-TACT (PLAY)	
SW708	9-885-069-77	SWITCH-TACT (DVD)	
SW709	9-885-069-77	SWITCH-TACT (EJECT)	
SW710	9-885-069-77	SWITCH-TACT (COPYV2D)	
SW711	9-885-069-77	SWITCH-TACT (REC)	
SW713	9-885-069-77	SWITCH-TACT (FF)	
SW714	9-885-069-77	SWITCH-TACT (OPEN)	
SW715	9-885-069-77	SWITCH-TACT (REW)	
SW716	9-885-069-77	SWITCH-TACT (STOP)	
		JACK BOARD	
		**********	
		< DIODE >	
AD1	9-885-070-27	DIODE-ARRAY DAN202K	
AD2	9-885-070-27	DIODE-ARRAY DAN202K	
AD3	9-885-070-27	DIODE-ARRAY DAN202K	
AD4	9-885-070-11	DIODE-SWITCHING	DAN217
AD5	9-885-070-27	DIODE-ARRAY DAN202K	
AMD1	9-885-070-28	DIODE-ARRAY DAP202K	
AZ1	9-885-070-22	DIODE-ZENER UDZ9.1B	
AZ2	9-885-070-22	DIODE-ZENER UDZ9.1B	
AZ3	9-885-070-22	DIODE-ZENER UDZ9.1B	
AZ4	9-885-070-22	DIODE-ZENER UDZ9.1B	
AZ50	9-885-070-22	DIODE-ZENER UDZ9.1B	

JACK **VCR MAIN**

Ref. No.	Part No.	Description		Remarks
AZ51	9-885-070-22	DIODE-ZENER	UDZ9.1B	
AZ52	9-885-070-22	DIODE-ZENER	UDZ9.1B	
AZ53	9-885-070-22	DIODE-ZENER	UDZ9.1B	
AZ55	9-885-070-22	DIODE-ZENER	UDZ9.1B	
AZ56	9-885-070-22	DIODE-ZENER	UDZ9.1B	
AZ57	9-885-070-22	DIODE-ZENER	UDZ9.1B	
AZ58	9-885-070-22	DIODE-ZENER	UDZ9.1B	
DOZ1	9-885-070-22	DIODE-ZENER	UDZ9.1B	
DOZ2	9-885-070-22	DIODE-ZENER	UDZ9.1B	
DOZ3	9-885-070-22	DIODE-ZENER	UDZ9.1B	
QD01	9-885-070-27	DIODE-ARRAY	DAN202K	
VZ1	9-885-070-22	DIODE-ZENER	UDZ9.1B	
VZ2	9-885-070-22	DIODE-ZENER	UDZ9.1B	
VZ3	9-885-070-22	DIODE-ZENER	UDZ9.1B	
VZ4	9-885-070-22	DIODE-ZENER	UDZ9.1B	
VZ5	9-885-070-22	DIODE-ZENER	UDZ9.1B	
VZ6	9-885-070-22	DIODE-ZENER	UDZ9.1B	
VZ7	9-885-070-22	DIODE-ZENER	UDZ9.1B	
VZ8	9-885-070-22	DIODE-ZENER	UDZ9.1B	
VZ9	9-885-070-22	DIODE-ZENER	UDZ9.1B	
VZ10	9-885-070-22	DIODE-ZENER	UDZ9.1B	
VZ50	9-885-070-22	DIODE-ZENER	UDZ9.1B	
VZ51	9-885-070-22	DIODE-ZENER	UDZ9.1B	
		< IC >		
AIC4	9-885-070-53	IC 4560 (OP AMP)		
AIC5	9-885-070-53	IC 4560 (OP AMP)		
IC801	9-885-069-93	IC SV1274/LA7274M		
IC4M01	9-885-070-60	IC LA72670M (SIGNAL PROCESSOR)		
VIC1	9-885-070-59	IC LA73054 (VIDEO PROCESS)		
		< TRANSISTOR >		
AMQ1	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L	
AMQ2	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L	
AQ1	9-885-070-34	TR-DIGITAL		
AQ2	9-885-070-37	TR-DIGITAL	KSR2103	
AQ3	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L	
AQ4	9-885-070-34	TR-DIGITAL		
AQ5	9-885-070-37	TR-DIGITAL	KSR2103	
AQ6	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L	
AQ7	9-885-070-34	TR-DIGITAL		
AQ8	9-885-070-37	TR-DIGITAL	KSR2103	
AQ9	9-885-070-29	TR-SMALL SIGNAL	KSA812	
AQ10	9-885-070-29	TR-SMALL SIGNAL	KSA812	
Q801	9-885-070-29	TR-SMALL SIGNAL	KSA812	
QS01	9-885-070-29	TR-SMALL SIGNAL	KSA812	
QS02	9-885-070-29	TR-SMALL SIGNAL	KSA812	
QS03	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L	
QS04	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L	
		< CABLE-FLAT >		
CN1B	9-885-069-79	CABLE-FLAT 40P		
CN3B	9-885-069-79	CABLE-FLAT 40P		
		< FILTER >		
DOL1	9-885-069-75	FILTER-EMI SMD		
		< TUNER >		
TM401	9-885-070-02	TM BLOCK TCMN0682PA20A		

Ref. No.	Part No.	Description		Remarks
		VCR MAIN BOARD		
		**********		
	9-885-069-99	ASSY PCB-MAIN		
SC1P05	9-885-069-85	SCREW-TAPTITE ZPC (YEL) SWR		
SC1S30	9-885-069-85	SCREW-TAPTITE ZPC (YEL) SWR		
SC1S31	9-885-069-85	SCREW-TAPTITE ZPC (YEL) SWR		
SC1S32	9-885-069-85	SCREW-TAPTITE ZPC (YEL) SWR		
SC1S33	9-885-069-85	SCREW-TAPTITE ZPC (YEL) SWR		
		< COIL >		
BD1P01	1-400-085-11	INDUCTOR	70uH	
BD1S01	1-400-085-11	INDUCTOR	70uH	
BD1S02	1-400-085-11	INDUCTOR	70uH	
		< CONNECTOR >		
CN301	1-815-685-11	CONNECTOR FPC 10P		
CN303	1-815-688-11	CONNECTOR FPC 6PSN		
		< CABLE-FLAT >		
CN303B	9-885-069-80	CABLE-FLAT 6P		
		< DIODE >		
BD01	9-885-070-14	DIODE-RECTIFIER	1N5397GP	
BD02	9-885-070-14	DIODE-RECTIFIER	1N5397GP	
BD03	9-885-070-14	DIODE-RECTIFIER	1N5397GP	
BD04	9-885-070-14	DIODE-RECTIFIER	1N5397GP	
D601	9-885-070-12	DIODE-SWITCHING	1N4148	
D605	9-885-070-12	DIODE-SWITCHING	1N4148	
D701	9-885-070-12	DIODE-SWITCHING	1N4148	
D702	9-885-070-12	DIODE-SWITCHING	1N4148	
D703	9-885-070-12	DIODE-SWITCHING	1N4148	
D704	9-885-070-12	DIODE-SWITCHING	1N4148	
D705	9-885-070-12	DIODE-SWITCHING	1N4148	
D706	9-885-070-12	DIODE-SWITCHING	1N4148	
D707	9-885-070-12	DIODE-SWITCHING	1N4148	
D708	9-885-070-12	DIODE-SWITCHING	1N4148	
D1P101	9-885-070-12	DIODE-SWITCHING	1N4148	
D1P102	9-885-070-12	DIODE-SWITCHING	1N4148	
D1P103	9-885-070-12	DIODE-SWITCHING	1N4148	
D1S05	9-885-070-13	DIODE-RECTIFIER	UF4007	
D1S06	9-885-070-12	DIODE-SWITCHING	1N4148	
D1S07	9-885-070-16	DIODE-RECTIFIER	F1T4	
D1S30	9-885-070-26	DIODE-SCHOTTKY	SRAF560	
D1S31	9-885-070-26	DIODE-SCHOTTKY	SRAF560	
D1S32	9-885-070-26	DIODE-SCHOTTKY	SRAF560	
D1S33	9-885-070-26	DIODE-SCHOTTKY	SRAF560	
D1S34	9-885-070-16	DIODE-RECTIFIER	F1T4	
D1S35	9-885-070-15	DIODE-RECTIFIER	SHG2D	
D1S36	9-885-070-16	DIODE-RECTIFIER	F1T4	
D1S37	9-885-070-16	DIODE-RECTIFIER	F1T4	
D1S40	9-885-070-16	DIODE-RECTIFIER	F1T4	
ZD401	9-885-070-19	DIODE-ZENER	UZP33B	
ZD1P02	9-885-070-24	DIODE-ZENER	MTZJ12B	
ZD1P03	9-885-070-21	DIODE-ZENER	MTZJ9.1B	
ZD1P04	9-885-070-20	DIODE-ZENER	MTZJ5.1B	
ZD1P05	9-885-070-18	DIODE-ZENER	UZP27B	
ZD1P06	9-885-070-17	DIODE-ZENER	UZ5.6BM	
ZD1S01	9-885-070-25	DIODE-ZENER	MTZJ4.3B	

Ref. No.	Part No.	Description	Remarks
ZD1S02	9-885-070-23	DIODE-ZENER	MTZJ18C
		< FUSE >	
⚠F1S01	9-885-069-78	FUSE-CARTRIDGE (1.6A/250V)	
		< IC >	
IC301	9-885-070-58	IC LA71207 (VIDEO PROCESS)	
IC501	9-885-070-60	IC LA72670M (SIGNAL PROCESSOR)	
IC601	9-885-053-39	IC (MICOM)	
IC603	9-885-070-49	IC KS24C041C (EEPROM)	
IC701	9-885-070-48	IC PT6315 (VFD)	
IC1P01	9-885-069-92	IC KA78R12 (VOLT REGU)	
IC1P02	9-885-069-92	IC KA78R12 (VOLT REGU)	
IC1P03	9-885-070-56	IC G9105 (POSI.FIXED REG)	
IC1P04	9-885-069-92	IC KA78R12 (VOLT REGU)	
IC1P05	9-885-070-57	IC G9205 (POSI.FIXED REG)	
IC1S01	9-885-070-55	IC ICE2BS01 (PWM CONTROLLER)	
IC1S02	9-885-070-43	PHOTO-COUPLER	
IC1S03	1-804-445-11	IC KA4318	
IC6B1	1-804-773-11	IC RESET	
		< COIL >	
L301	1-400-085-11	INDUCTOR	70uH
L303	1-400-085-11	INDUCTOR	70uH
L305	1-400-085-11	INDUCTOR	70uH
L306	9-885-070-66	INDUCTOR-RADIAL	15mH
⚠L1S02	1-424-830-11	LINE FILTER	30mH
L1S30	9-885-070-00	COIL CHOKE	22uH
L1S31	9-885-070-00	COIL CHOKE	22uH
L1S32	1-424-828-11	COIL CHOKE	10uH
		< LED >	
LD601	9-885-070-40	LED-IR SIDE-VIEW	
		< TRANSFORMER >	
⚠PT01	9-885-069-94	TRANS SWITCHING EER3531	
		< PHOTO-INTERRUPTER >	
PT601	9-885-070-44	PHOTO-INTERRUPTER (S-REEL)	
PT602	9-885-070-44	PHOTO-INTERRUPTER (T-REEL)	
		< TRANSISTOR >	
Q302	9-885-070-29	TR-SMALL SIGNAL	KSA812
Q303	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L
Q304	9-885-070-29	TR-SMALL SIGNAL	KSA812
Q305	9-885-070-33	TR-SMALL SIGNAL	KTC3203-Y
Q306	9-885-070-29	TR-SMALL SIGNAL	KSA812
Q307	9-885-070-33	TR-SMALL SIGNAL	KTC3203-Y
Q308	9-885-070-33	TR-SMALL SIGNAL	KTC3203-Y
Q601	9-885-070-35	TR-DIGITAL	KSR1104
Q701	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L
Q702	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L
Q703	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L
Q704	9-885-070-30	TR-SMALL SIGNAL	KSC1623-L
Q1P103	9-885-070-38	FET-SILICON	FQP33N10
Q1P105	9-885-070-31	TR-SMALL SIGNAL	KSC2328A-Y
Q1P106	9-885-070-36	TR-DIGITAL	KSR2001
Q1P107	9-885-070-32	TR-SMALL SIGNAL	KSC945
Q1P108	9-885-070-31	TR-SMALL SIGNAL	KSC2328A-Y
Q1P109	9-885-070-31	TR-SMALL SIGNAL	KSC2328A-Y
Q1P110	9-885-070-31	TR-SMALL SIGNAL	KSC2328A-Y
Q1S01	9-885-070-39	FET-SILICON	SPA04N60C3
		< PHOTO TRANSISTOR >	
S601	9-885-070-42	PHOTO TR (END SENSOR)	
S602	9-885-070-42	PHOTO TR (START SENSOR)	
		< SWITCH >	
SW602	9-885-061-07	SWITCH REC (REC-SW)	
SW603	9-885-061-06	SWITCH MODE (MODE-SW)	
		< VARISTOR >	
VA1S01	9-885-070-65	VARISTOR	
		< VIBRATOR >	
XT301	9-885-070-68	CRYSTAL-UNIT (3.579545MHz)	
XT601	9-885-070-67	CRYSTAL-UNIT (14.31818MHz)	
		MISCELLANEOUS	
		**********	
003	9-885-069-76	FAN-DC CF-12715S	
⚠P025	1-824-674-11	POWER CORD EP2 SPT-2	
T001	9-885-069-98	ASSY-CYLINDER	
T003	1-763-836-11	MOTOR-LOADING ASSY	
T044	9-885-063-61	MOTOR CAPSTAN	
		ACCESSORIES & PACKING MATERIALS	
		**********	
	1-479-094-11	REMOTE COMMANDER (RMT-V505)	
	2-186-506-11	MANUAL, INSTRUCTION (ENGLISH)	
	2-186-506-21	MANUAL, INSTRUCTION (FRENCH)	
	2-187-643-11	DOOR (RW2), SLIDE (for RMT-V505)	
	3-071-119-91	COVER, BATTERY (for RMT-V505)	

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

Sony Corporation
Home Electronics Network Company

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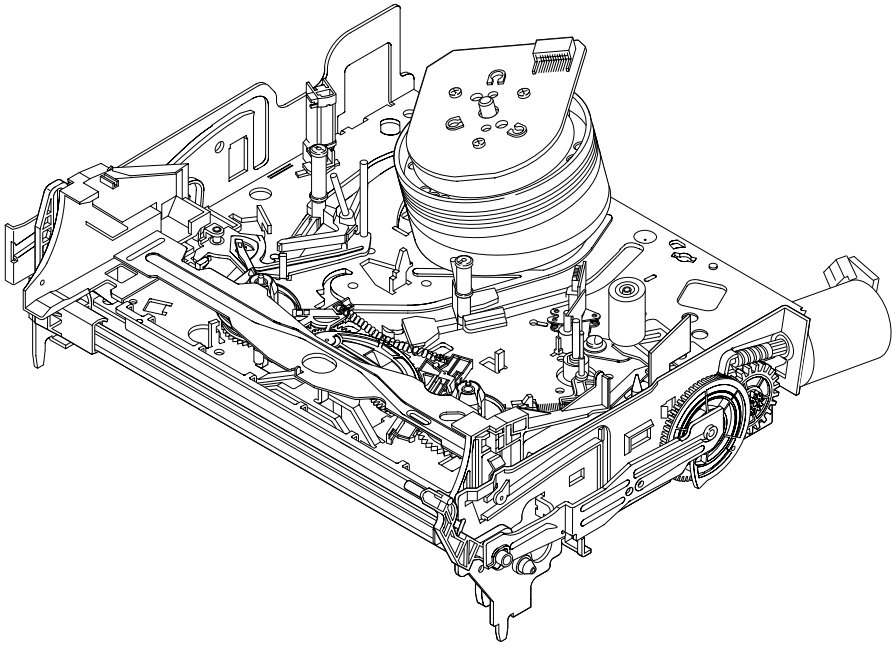
9-874-845-11

VHS MECHANICAL ADJUSTMENT MANUAL VII

TS-10 MECHANISM

Please use this manual with the service manual.



VHS MECHANISM DECK

SONY®

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1. Disassembly and Reassembly

1-1 Deck Parts Locations

1-1-1 Top View

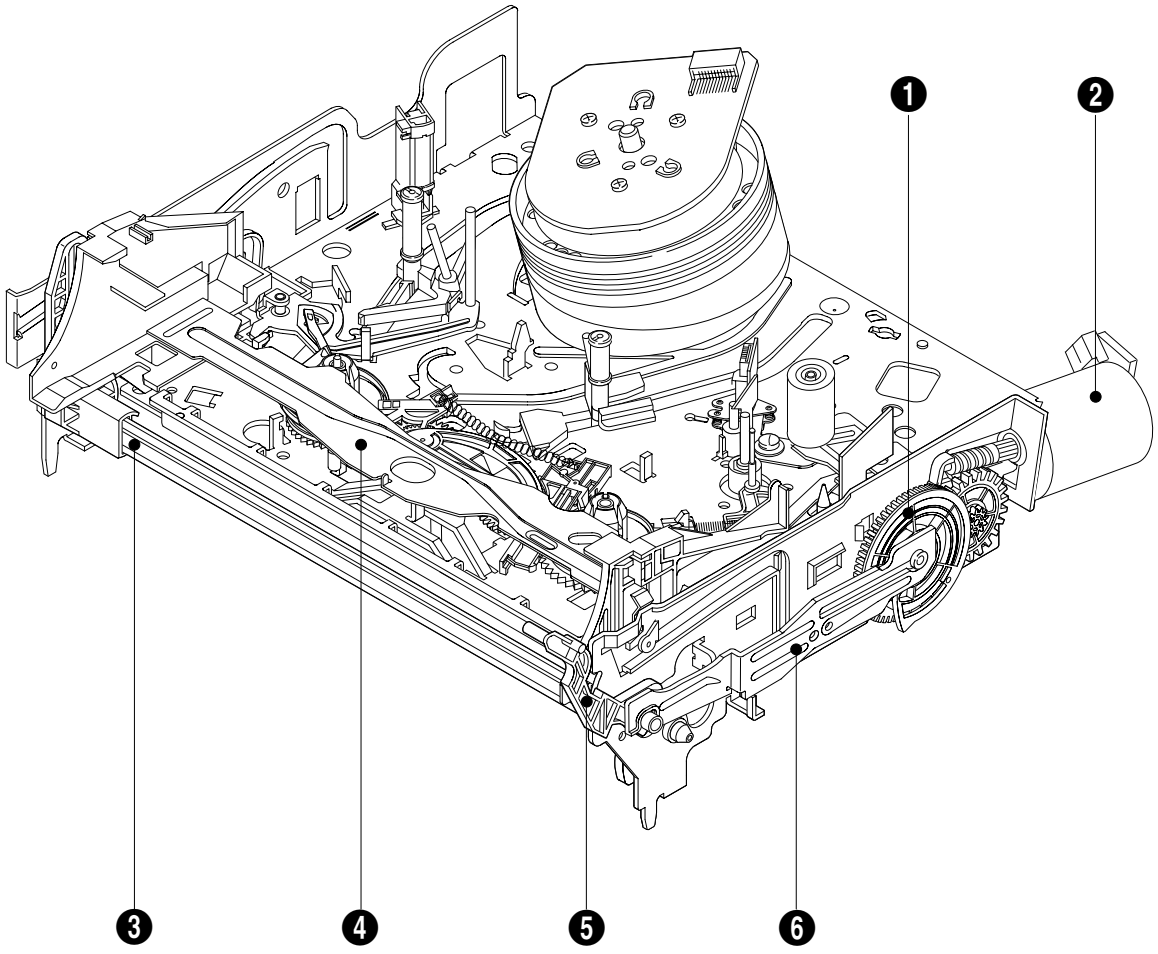


Fig. 1-1 Top parts Location-1

1. GEAR FL CAM
2. MOTOR LOADING ASS'Y
3. LEVER FL ARM ASS'Y
4. HOLDER FL CASSETTE ASS'Y
5. LEVER FL DOOR
6. SLIDER FL DRIVE

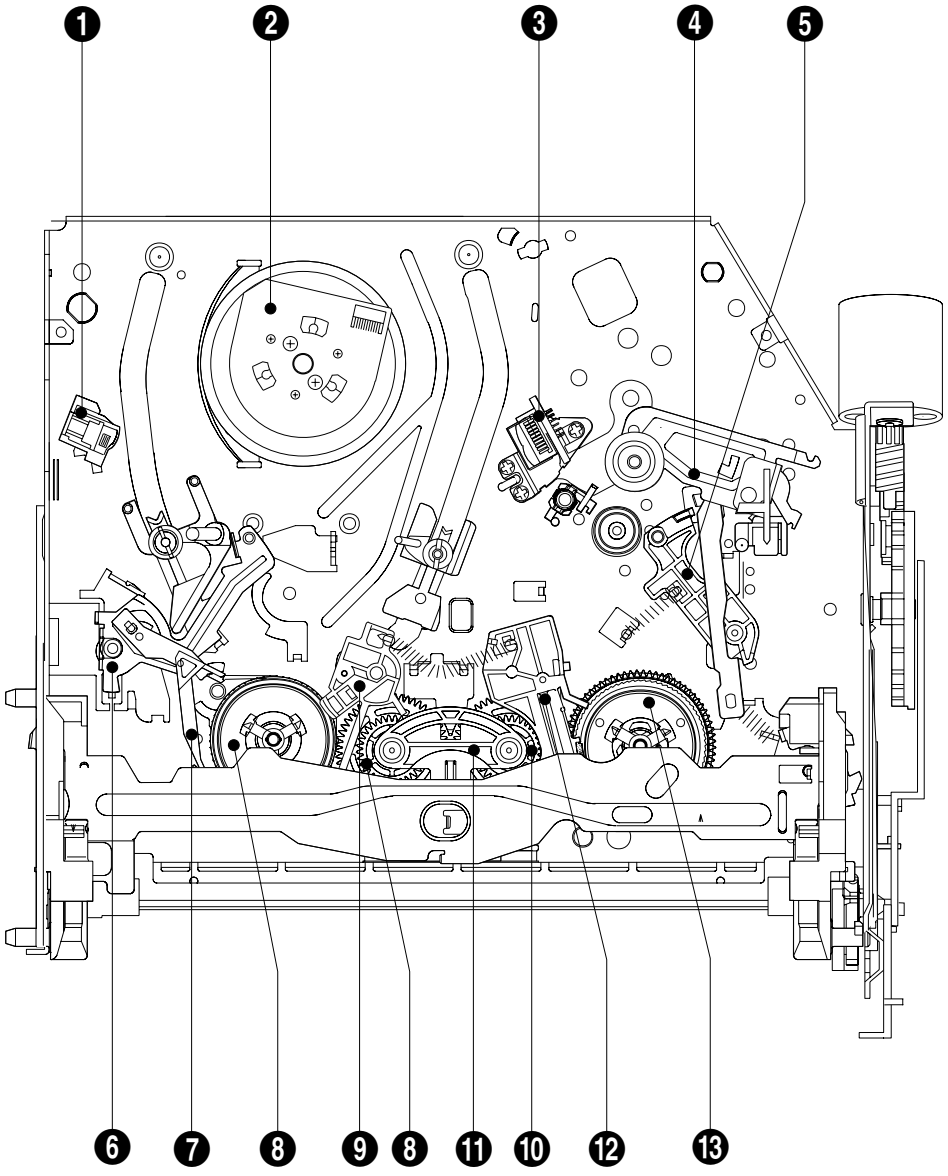


Fig. 1-2 Top Parts Location-2

❶ FE HEAD
❷ CYLINDER ASS'Y
❸ ACE HEAD ASS'Y
❹ LEVER UNIT PINCH ASS'Y
❺ LEVER #9 GUIDE ASS'Y
❻ LEVER TENSION ASS'Y
❼ BAND BRAKE ASS'Y
❽ DISK S REEL
❾ LEVER S BRAKE ASS'Y
❿ GEAR IDLE
⓫ LEVER IDLE
⓬ LEVER T BRAKE ASS'Y
⓭ DISK T REEL

1-1-2 Bottom View

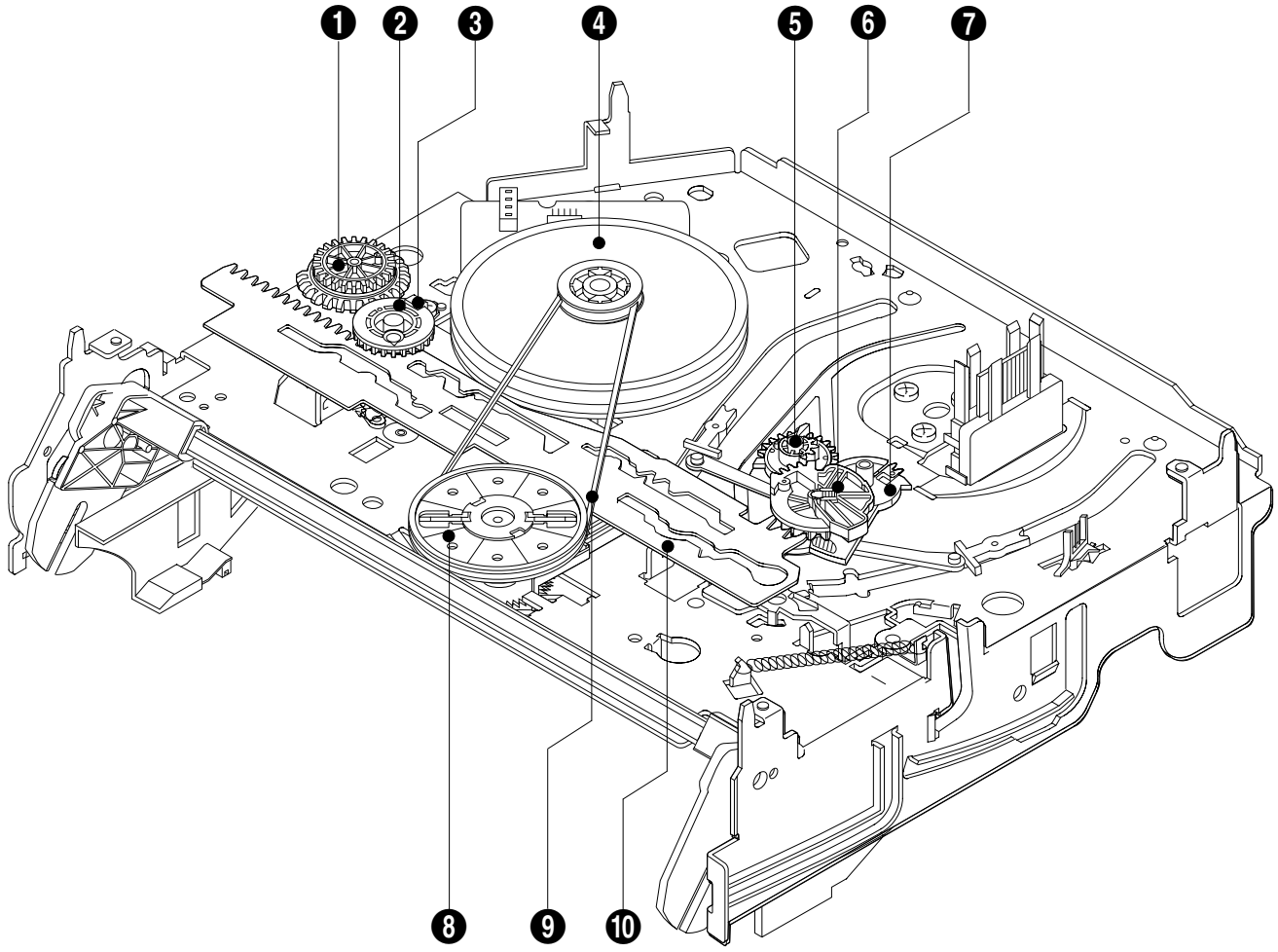


Fig. 1-3 Bottom Parts Location

❶ GEAR JOINT 1
❷ GEAR JOINT 2
❸ BRACKET GEAR
❹ MOTOR CAPSTAN ASS'Y
❺ LEVER T LOAD ASS'Y
❻ GEAR LOADING DRIVE
❼ LEVER S LOAD ASS'Y
❽ HOLDER CLUTCH ASS'Y
❾ BELT PULLEY
❿ SLIDER CAM

1-2-1 Lever FL Door Removal

1) Push the Holder FL Cassette Ass'y ❶ about 20mm in the direction of arrow “A”.
2) Rotate the Lever FL Door ❷ in the direction of arrow “B”.
3) Release the Hook ❸ and Remove the Lever FL Door ❷ in the direction of arrow “C”.

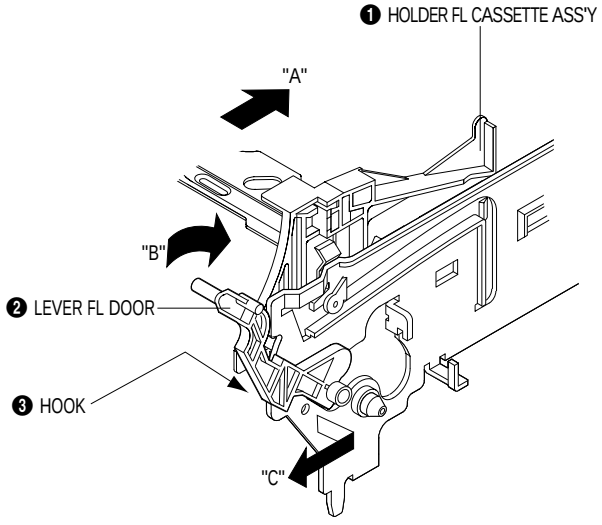


Fig. 1-4 Lever FL Door Removal

1-2-2 Holder FL Cassette Ass’y Removal

1) Pull the Holder FL Cassette Ass'y ❶ to the eject position.
2) Pull the Holder FL Cassette Ass'y ❶ as grasping the Holder FL Cassette Ass'y ❶ and Lever FL Cassette-R ❷ in the same time to release hooking from Main Base until the Boss [A] of Holder FL Cassette Ass'y ❶ is taken out from the Rail [B].
3) Lift the Holder FL Cassette Ass'y ❶, in this time, you have to grasp the Lever FL Cassette-R ❷ Continuously until the Holder FL Cassette Ass'y ❶ is taken out completely.

Note : Be sure to insert Lever FL Cassette-R ❷ in the direction of “A” to prevent separation and breakage of the Lever FL Cassette-R ❷ at disassembling and reassembling.

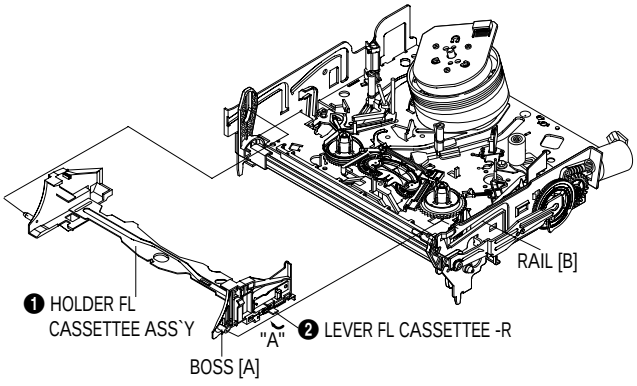


Fig. 1-5 Holder FL Cassette Ass’y Removal

1-2-3 SIider FL Drive, Gear FL Cam Removal

1) Pull the Slider FL Drive ❶ to the front direction.
2) Remove the Slider FL Drive ❶ in the direction of arrow. (Refer to Fig. 1-6)
3) Remove the Gear FL cam ❷.

Note : When reinstalling be sure to reassemble Slider FL drive ❶ after you insert the Boss of Lever FL ARM-R in Groove of Slider Fl drive ❶.

Assembly : Align the Gear FL Cam ❶ with the Gear worm wheel Post as shown drawing.
(Refer to Timing point)

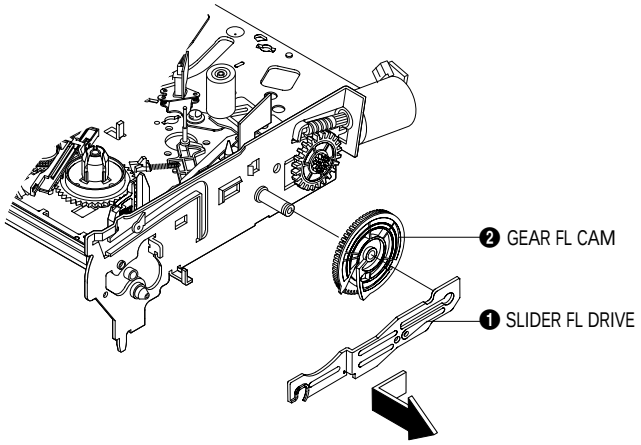


Fig. 1-6 Slider FL Drive Removal

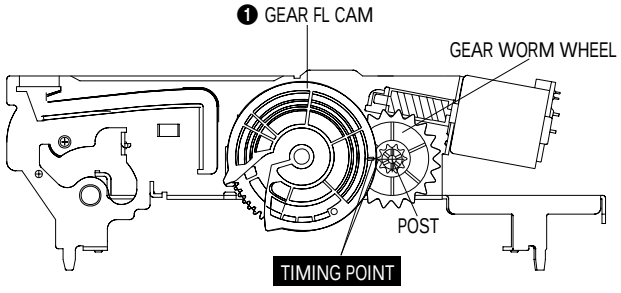


Fig. 1-7 Gear FL Cam, Gear Worm

1-2-4 Lever FL Arm Ass'y Removal

1) Push the hole "A" in the direction of arrow "B" use the pin.(about Dia.2.5)
2) Pull out the Lever FL Arm Ass'y ❶ from the Boss of Main Base.
3) Remove the Lever FL Arm Ass'y ❶ in the direction of arrow "C".

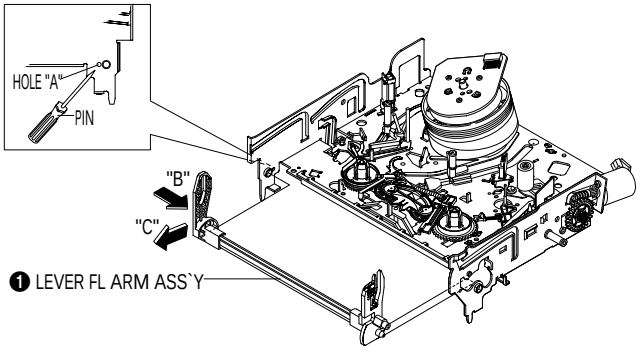


Fig. 1-8 Lever FL Arm Ass'y Removal

1-2-5 Gear Worm Wheel Removal

1) Remove the Gear Worm wheel ❶.

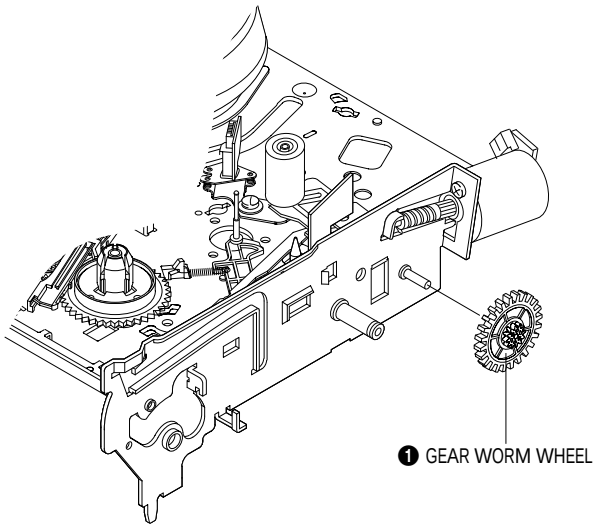


Fig. 1-9 Gear Worm Wheel Removal

1-2-6 Motor Loading Ass'y Removal

1) Remove the screw ❶.
2) Remove the Motor Loading Ass'y ❷.

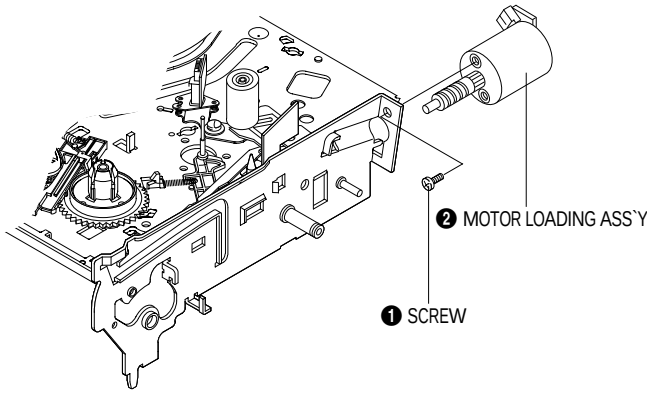


Fig. 1-10 Motor Loading Ass'y Removal

1-2-7 Bracket Gear, Gear Joint 2, 1 Removal

1) Remove the SCREW ❶.
2) Remove the Bracket Gear ❷.
3) Remove the Gear Joint 2 ❸.
4) Remove the Gear Joint 1 ❹.

Assembly :

1) Be sure to align dot mark of Gear Joint 1 ❶ with dot mark of Gear Joint 2 ❷ as shown Fig 1-12. (Refer to Timing point1)
2) Confirm the Timing Point 2 of the Gear Joint 2 ❷ and Slider Cam ❸.

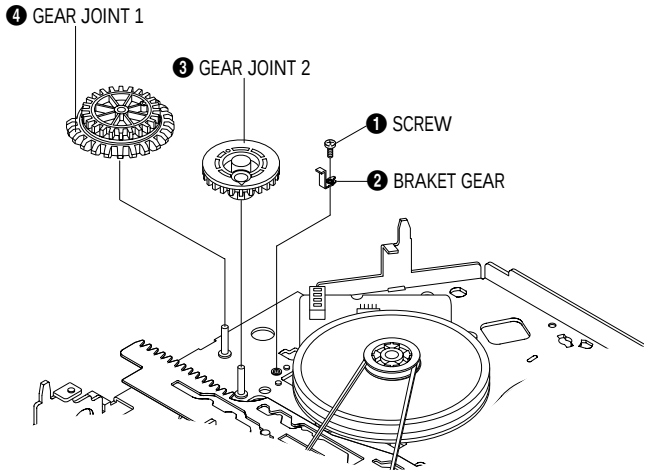


Fig. 1-11 Bracket Gear, Gear Joint 1,2 Removal

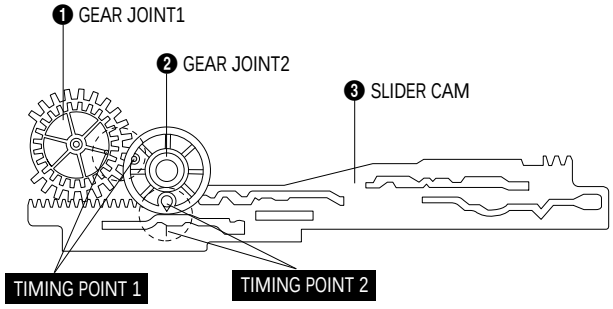


Fig. 1-12 Gear Joint 1,2 Assembly

1-2-8 Gear Loading Drive, Slider Cam, Lever Load S, T Ass'y Removal

1) Remove the Belt Pulley. (Refer to Fig. 1-30)
2) Remove the Gear Loading Drive ❶ after releasing Hook [A] in the direction arrow as shown in detail drawing.
3) Remove the Slider Cam ❷.
4) Remove the Lever Load S ❸, Link Load S ❺ & Lever Load T ❹, Link Load T ❻.

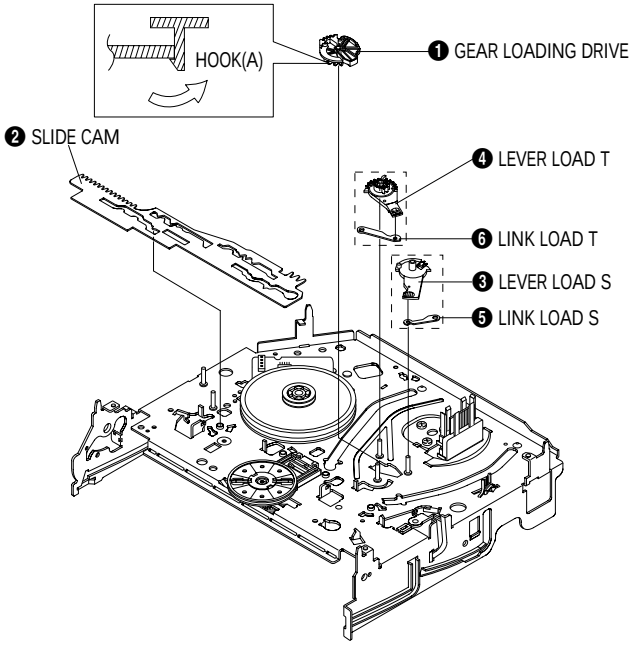


Fig. 1-13 Gear Loading Drive, Slider Cam, Lever T, S Load Ass'y Removal

1-2-9 Gear Loading Drive, Slider Cam, Lever Load S, T Ass'y Assembly

1) When reinstalling, be sure to align dot of Lever Load T Ass'y ❶ with dot of Lever Load S Ass'y ❷ as shown in drawing, (Refer to Timing Point 1).
2) Insert the Pin A,B,C,D into the Slider Cam ❸ hole,
3) Be sure to align dot of Lever Load T ❶ and dot of Gear Loading Drive ❹, (Refer to Timing Point 2).
4) Aline dot of Gear Loading drive ❹ with mark of Slider Cam ❸ as shown in drawing(Refer to Timing Point 3).

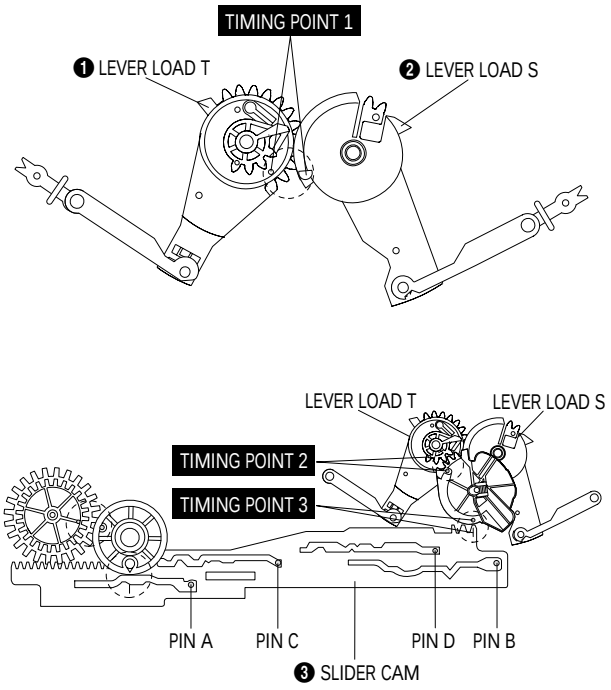


Fig. 1-14 Gear Loading Drive, Slider Cam, Lever Load S, T Ass'y Assembly

1-2-10 Lever Pinch Drive, Lever Tension Drive Removal

1) Remove the Lever Pinch Drive ❶, Lever Tension Drive ❷.

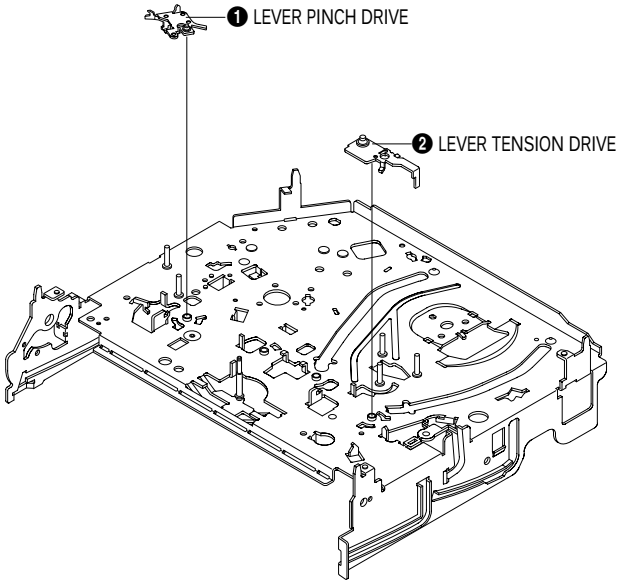


Fig. 1-15 Lever Pinch Drive, Lever Tension Drive Removal

1-2-11 Lever Tension Ass'y, Band Brake Ass'y Removal

1) Remove the Lever Brake S Ass'y (Refer to Fig 1-17).
2) Remove the Spring Tension Lever ❶.
3) Rotate stopper of Main Base in the direction of arrow "A".
4) Lift the Lever Tension Ass'y ❷ & Band brake Ass'y ❸.

Note :
1) When replacing the Lever Tension Ass'y ❷, be sure to apply Grease on the post,
2) Take care not to touch stain on the felt side, and not to be folder and broken Band brake Ass'y
3) After Lever Tension Ass'y seated, Rotate stopper of Main Base to the Mark[B].

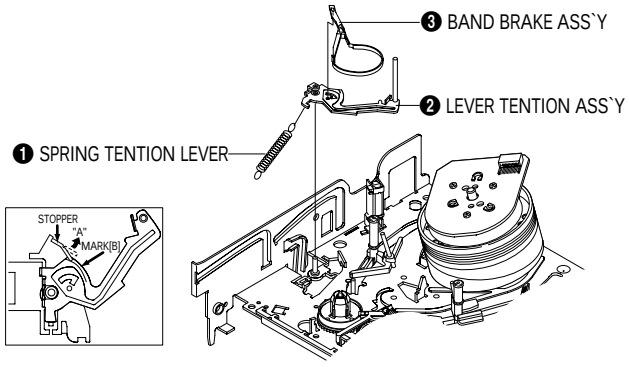


Fig. 1-16 Lever Tension Ass'y, Band Brake Ass'y Removal

1-2-12 Lever Brake S, T Ass'y Removal

1) Release the Hook [A] and the Hook [B], [C] in the direction of arrow as shown in Fig 1-17.
2) Lift the Lever S, T Brake Ass'y ❶, ❷ with spring brake ❸.

Assembly :
1)Assembly the Lever S Brake Ass'y ❶ on the Main Base.
2)Assembly the Lever T Brake Ass'y ❷ with spring brake ❸.

Note : Take extreme care not to be folded and transformed Spring Brake at removing or reinstalling.

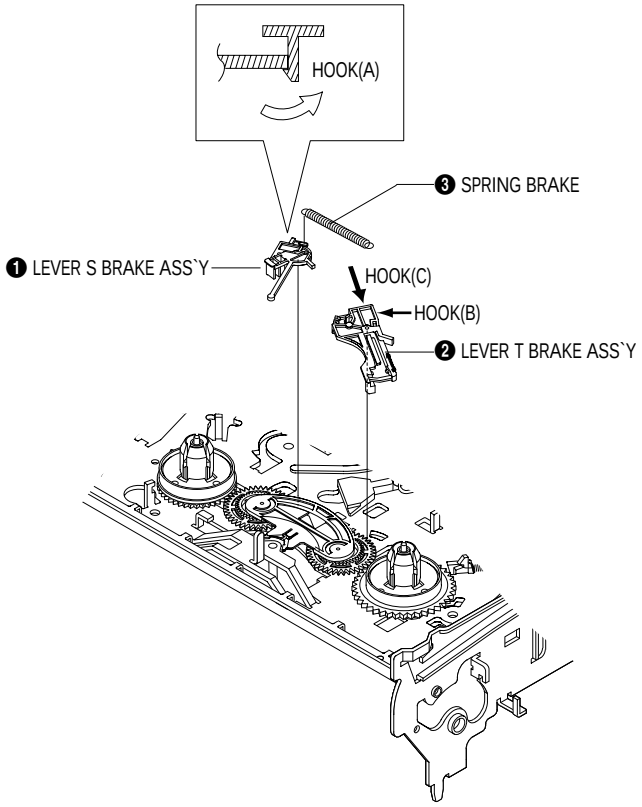


Fig. 1-17 Lever Brake S, T Ass'y Removal

1-2-13 Gear Idle Ass'y Removal

1) Push the Lever Idle ❶ in the direction of arrow "A", "B".
2) Lift the Lever Idle ❶.

Assembly :
1) Apply oil in two Bosses of Lever Idle ❶.
2) Assemble the Gear Idle ❷ with the Lever Idle ❶.

Note : When replacing the Gear Idle ❷, be sure to add oil in the boss of Lever Idle ❶.

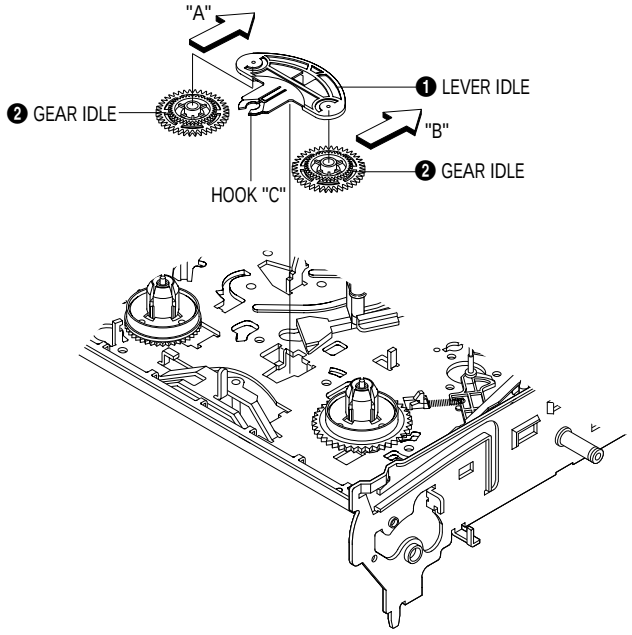


Fig. 1-18 Gear Idle Ass'y Removal

1-2-14 Disk S, T Reel Removal

1) Lift the Disk S, T Reel ❶, ❷.

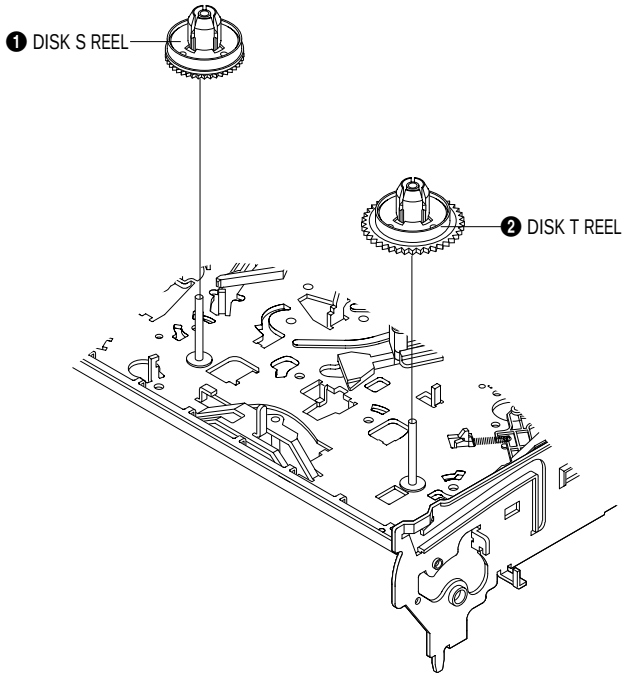


Fig. 1-19 Disk S, T Reel Removal

1-2-15 Holder Clutch Ass'y Removal

1) Remove the Washer Slit ❶.
2) Lift the Holder Clutch Ass'y ❷.

Note : When you reinstall Holder Clutch Ass'y
1) Check the condition of spring as shown in detail A.
2) Don't push Holder Clutch Ass'y down with excessive force Just insert Holder Clutch Ass'y into post center with dead force and Rotate it smoothly.
Be sure to confirm that spring is in the slit of Gear Center Ass'y as shown in detail B.

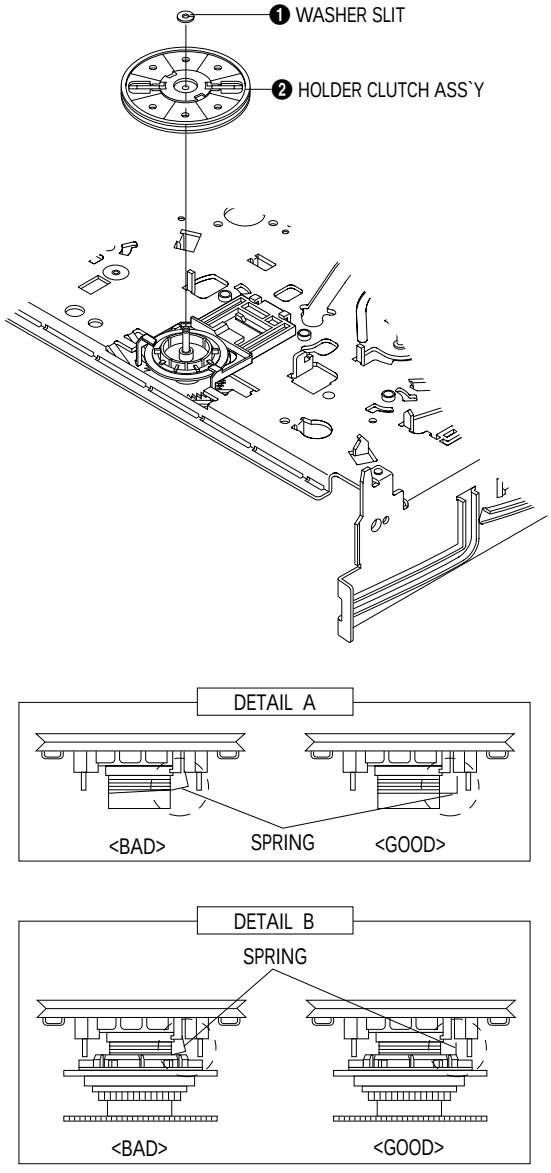


Fig. 1-20 Holder Clutch Ass'y Removal

1-2-16 Lever Up Down Ass'y, Gear Center Ass'y Removal

1) Remove the 2 hooks in the direction of arrow as shown Fig. 1-21 and lift the Lever Up Down Ass'y ❶.
2) Lift the Gear Center Ass'y ❷.

Assembly :
1) Insert the Lever Up Down Ass'y ❶ in the rectangular holes on Main Base as shown in Fig 1-22.
2) Lift the Lever Up Down Ass'y ❶ about 35 degree.(Refer to Fig 1-22)
3) Insert Ring of the Gear Center Ass'y ❷ in the Guide of the Lever Up Down Ass'y ❶.
4) Insert the Gear Center Ass'y ❷ in the post on Main Base.
5) Push down the Lever Up Down Ass'y ❶ for locking of the Hook.

Note :
1) Take care not to separate and sentence does not mark sense.
2) Be sure to confirm that Ring of the Gear Center Ass'y ❷ is in the Guide of the Lever Up Down Ass'y ❶ after finishing assembly of Lever Up

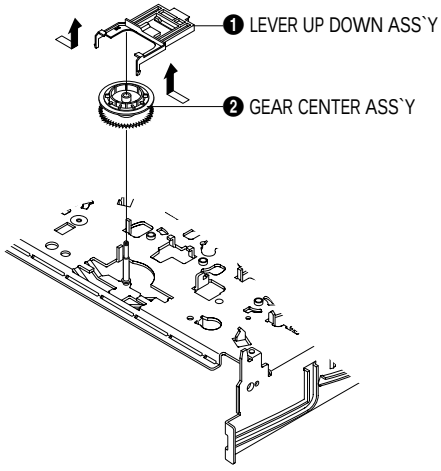


Fig. 1-21 Lever Up Down Ass'y Removal

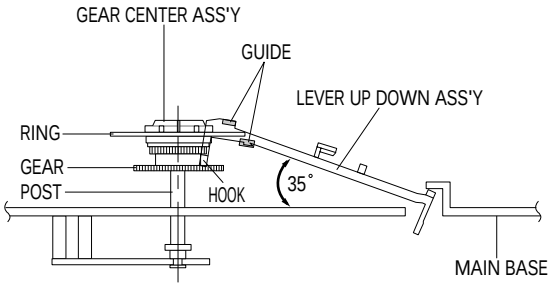


Fig. 1-22 Lever Up Down Ass'y Removal

1-2-17 Guide Cassette Door Removal

1) Lift the Hook [A].
2) Rotate the Guide Cassette Door ❶ in the direction of arrow.

Note : After reinstalling the Guide Cassette Door ❶ sure the Hook [A].

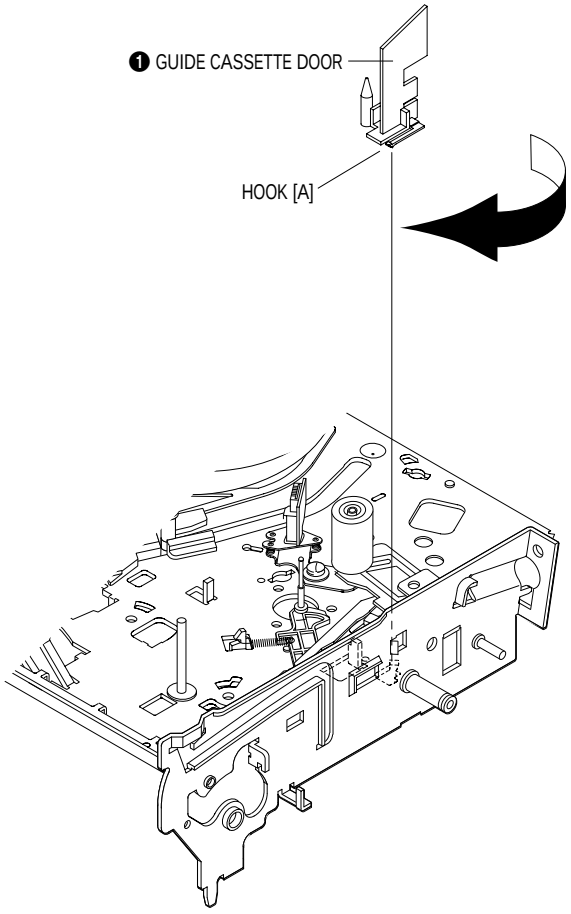


Fig. 1-23 Guide Cassette Door Removal

1-2-18 Lever Unit Pinch Ass'y, Plate Joint, Spring Pinch Drive Removal

1) Lift the Unit Pinch Ass'y ❶.
2) Remove the Plate Joint ❷ from Lever Pinch Drive.
3) Remove the Spring Pinch Drive ❸.

Note :
1) Take extreme care not to touch the grease on the Roller Pinch.
2) When reinstalling, be sure to apply grease on the post pinch roller.

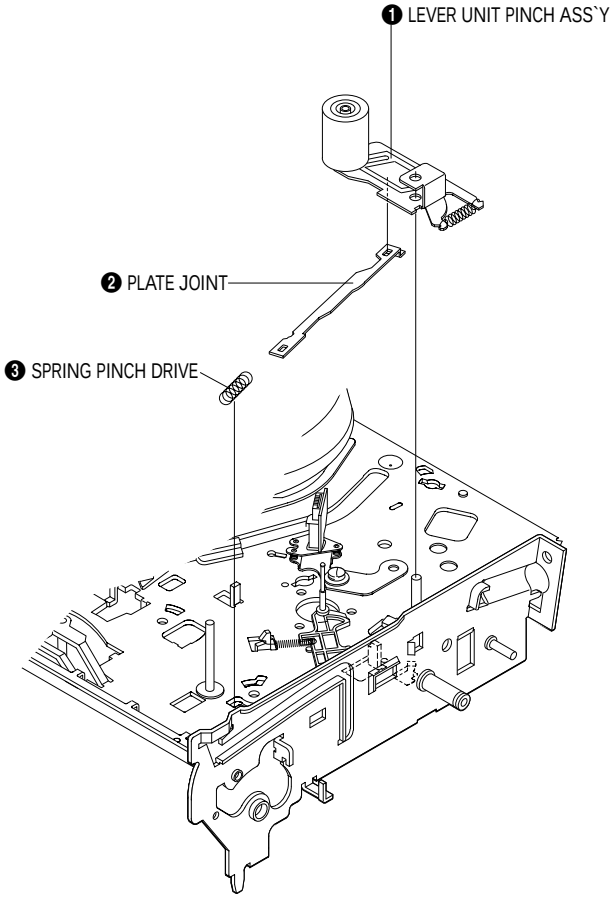


Fig. 1-24 Lever Unit Pinch Ass'y, Plate Joint, Spring Pinch Drive Removal

1-2-19 Lever #9 Guide Ass'y Removal

1) Remove the Spring #9 Guide ❶.
2) Lift the Spring #9 Guide Ass'y ❷ in the direction of arrow "A".

Note :
1) Take extreme care not to get grease on the tape Guide Post.
2) After reinstalling, check the bottom side of the Post #9 Guide to the top side of Main Base.

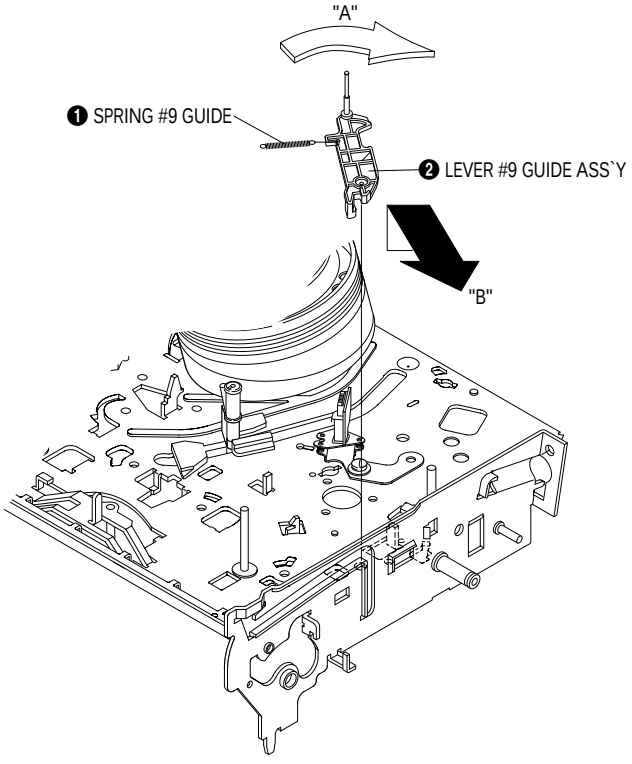


Fig. 1-25 Lever #9 Guide Ass'y Removal

1-2-20 FE Head Removal

1) Remove the screw ❶.
2) Lift the FE Head ❷.

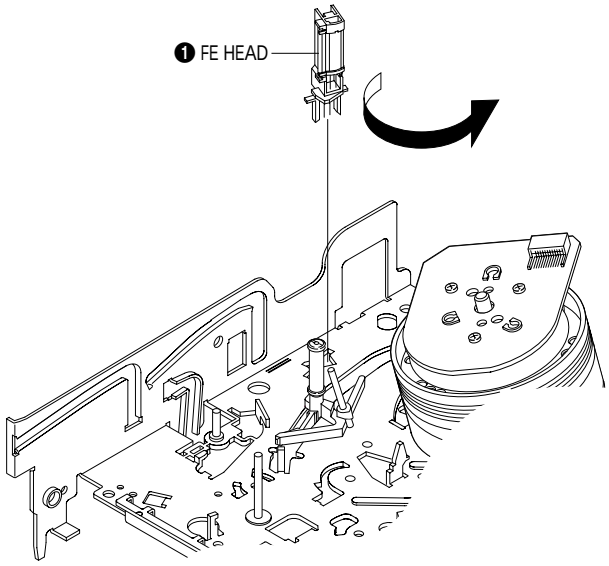


Fig. 1-26 FE Head Removal

1-2-21 ACE Head Removal

1) Pull out the FPC from connector of ACE Head Ass'y ❷.
2) Remove the screw ❶.
3) Lift the ACE Head Ass'y ❷.

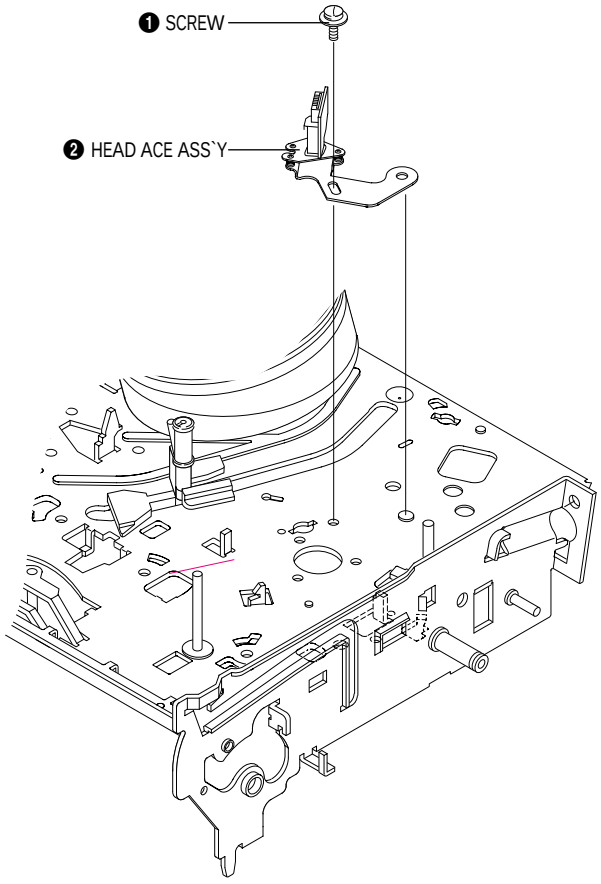


Fig. 1-27 ACE Head Removal

1-2-22 Slider S, T Ass'y Removal

1) Move the Slider S, T Ass'y ❶, ❷ to slot, and then lift it to remove. (Refer to arrow)

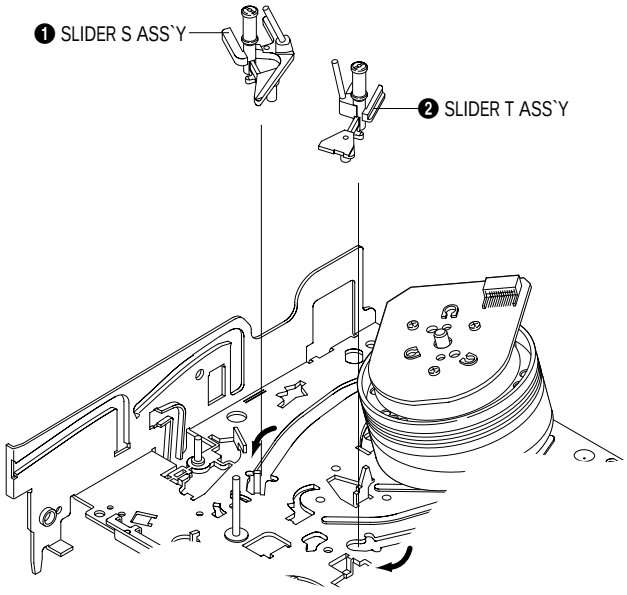


Fig. 1-28 Slider S, T Ass'y Removal

1-2-23 Plate Ground Deck, Cylinder Ass'y Removal

1) Remove the 3 Screws ❶.
2) Lift the Plate Ground Deck ❷.
3) Lift the Cylinder Ass'y ❸.

Assembly :
1) Match the 3 holes in the bottom of Cylinder ass'y ❸ to the 3 holes of Main Base as attending not to drop or knock the Cylinder ass'y ❸.
2) Tighten the 1 Screw ❶.
3) Match the Plate Ground Deck ❷ to the Hole of Base Main.
4) Tighten the other 2 Screws ❶.

Note :
1) Take care not to touch the Cylinder Ass'y ❸ and the tape guide post at reinstalling.
2) When reinstalling, Don't push down too much on Screw Driver.

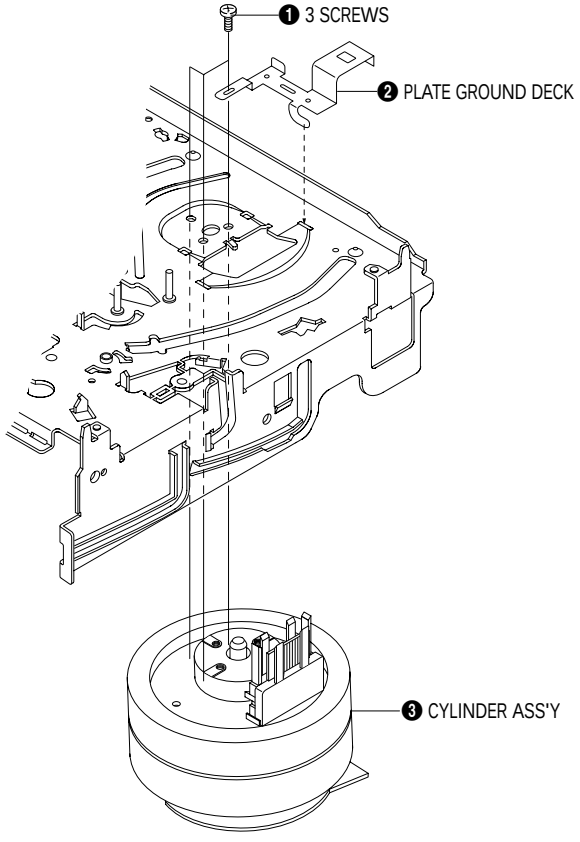


Fig. 1-29 Plate Ground Deck, Cylinder Ass'y Removal

1-2-24 Belt Pulley Removal

1) Remove the Belt Pulley ❶.

Note : Take extreme care not to get grease on Belt Pulley ❶ at assembling or reassembling.

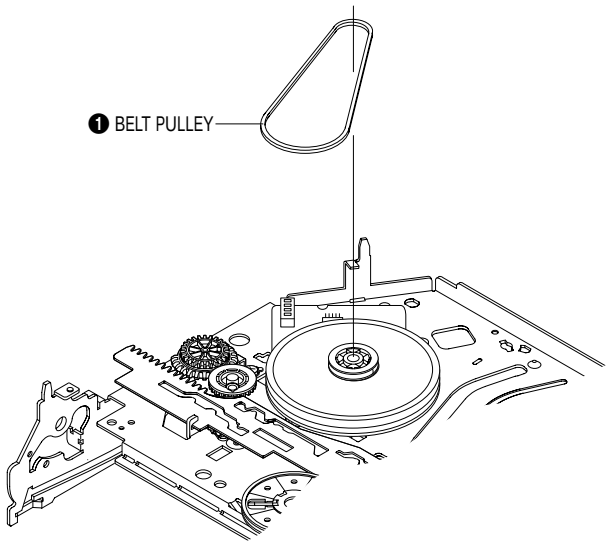


Fig. 1-30 Belt Pulley Removal

1-2-25 Level Head Cleaner Ass'y Removal

1) Release the Hook ❶.
2) Lift the Lever Head Cleaner Ass'y ❷.

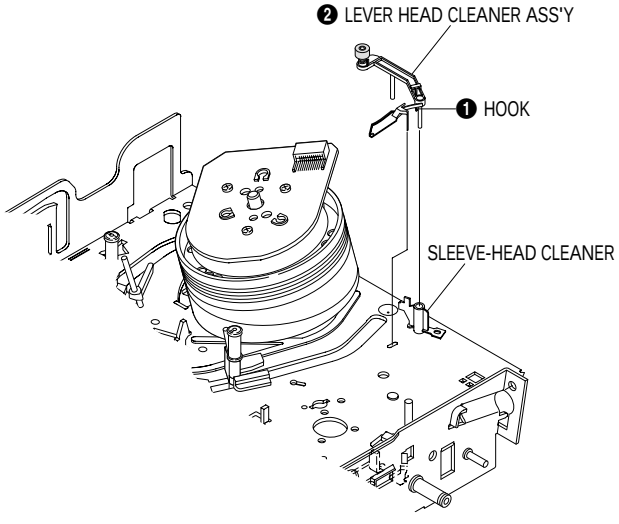


Fig. 1-31 Level Head Cleaner Ass'y Removal

1-2-26 Damper Capstan, Motor Capstan Ass'y Removal

1) Remove the Damper Capstan ❶ in the direction of arrow.
2) Remove the 3 Screws ❷.
3) Remove the Motor Capstan Ass'y ❸.

Assembly :

1) Match the 3 holes of Motor Capstan Ass'y ❸ to the 3 holes of Main Base. Be careful not to drop or knock the Motor Capstan Ass'y ❸.
2) Tighten the 3 Screws ❷ in the direction of arrow as shown detail drawing.
3) Assemble the Damper Capstan ❶.

Note : After tightening screws, check if there is gap between the head of screws and the top side of Main Base. There should have no gap between the head of screws and the top side of Main Base.
After reinstalling, adjusting the tape transport system again.

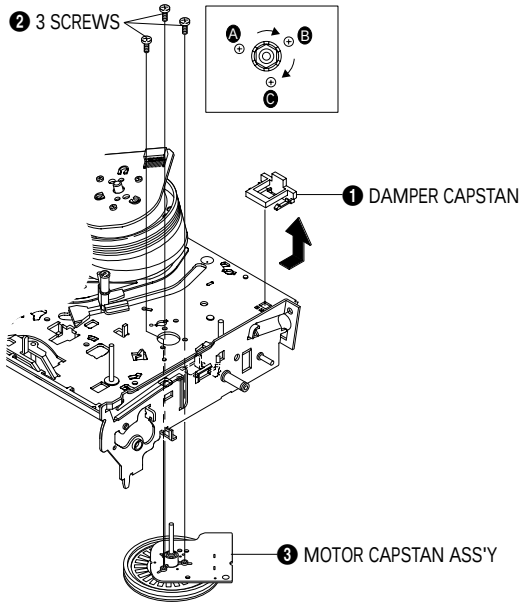


Fig. 1-32 Damper Capstan,Motor Capstan Ass'y Removal

1-2-27 How to Eject the Cassette Tape (If the unit does not operate on condition that is inserted into housing ass'y)

1) Turn the Gear worm ❶ clockwise with screw driver. (Refer to arrow)
(Other method : Remove the Screw of Motor Load Ass'y, Separate the Motor Load Ass'y)

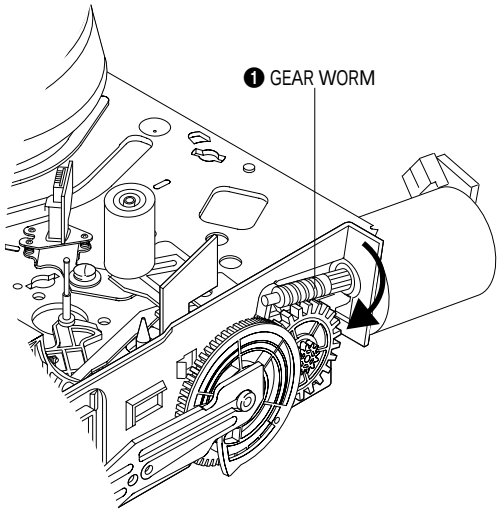


Fig. 1-33

2) When Slider S,T are approched in the position of unloading, rotate holder Clutch counterclockwise after inserting screw driver in the hole of frame's bottom in order to wind the unwinded tape. (Refer to Fig.1-34)
(If you rotate Gear Worm ❶ continuously when tape is in state of unwinding, you may cause a tape contamination by grease and tape damage. Be sure to wind the unwinded tape in the state of set horizontly.)
3) Rotate Gear Worm ❶ clockwise using screw driver again up to the state of eject mode and then pick out the tape.(Refer to Fig.1-33)

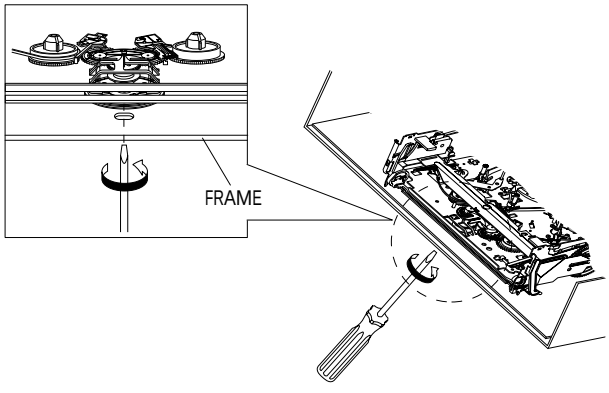


Fig. 1-34

1-3 The table of clearing, Lubrication and replacement time about principal parts

1) The replacement time of parts is not life of parts.
2) The table 1-1 is that the VCR Set is in normal condition (normal temperature, normal humidity).
   The checking period may be changed owing to the condition of use, runtime and environmental conditions.
3) Life of the Cylinder Ass'y is depend on the condition of use.
4) See exploded view for location of each parts.

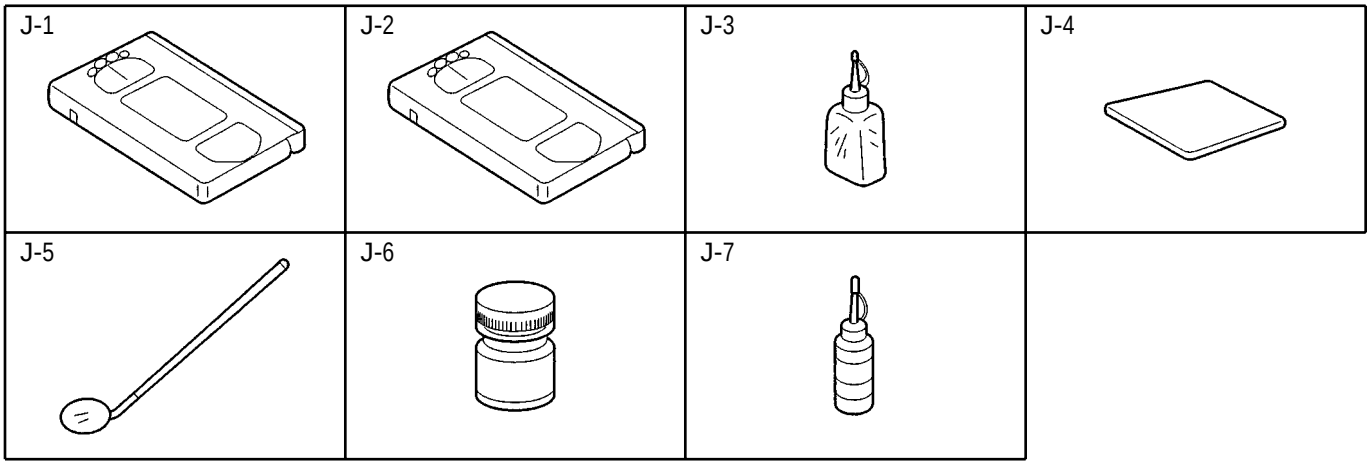
<Table 1-1>

*	Parts Name	Checking Period										Remark
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
TAPE PATH SYSTEM	POST TENSION	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	- To clean the parts, use patch and alcohol (solvent). - After cleaning, use the video tape after alcohol is gone away completely. - We recommend to use oil [NT-68] or solvent. - One or two drops of oil should be applied after cleaning with alcohol.
	SLANT POST S, T	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	#8 GUIDE SHAFT	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	CAPSTAN SHAFT	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	#9 GUIDE POST	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	#3 GUIDE POST	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	GUIDE ROLLER S, T	Δ	Δ	Δ	O	O	O	O	O	O	O	
	CYLINDER ASS'Y	Δ	O	O	O	O	O	O	O	O	O	
	FE HEAD	Δ	Δ	Δ	O	O	O	O	O	O	O	
	ACE HEAD	Δ	O	O	O	O	O	O	O	O	O	
	PINCH ROLLER	Δ	O	O	O	O	O	O	O	O	O	
	POST REEL S, T		◆		◆		◆		◆		◆	- Periodic time of applying oil (Apply oil after cleaning) - The excessive applying oil may be the cause of malfunction.
	SLEEVE TENSION		◆		◆		◆		◆		◆	
	POST CENTER		◆		◆		◆		◆		◆	
	LEVER IDLE BOSS (2Point)		◆		◆		◆		◆		◆	
DRIVING SYSTEM	CAPSTAN MOTOR PULLEY	Δ	Δ	Δ	Δ	Δ	O	O	O	O	O	
	BELT PULLEY				O	O	O	O	O	O	O	
	HOLDER CLUTCH ASS'Y	Δ	O	O	O	O	O	O	O	O	O	
	GEAR CENTER ASS'Y		O	O	O	O	O	O	O	O	O	
	GEAR IDLE (2Point)		O	O	O	O	O	O	O	O	O	
	LOADING MOTOR		O	O	O	O	O	O	O	O	O	
BRAKE SYSTEM	BAND BRAKE ASS'Y		O	O	O	O	O	O	O	O	O	
	BRAKE T ASS'Y		O	O	O	O	O	O	O	O	O	

Δ : Cleaning O : Check and replacement in necessary ◆ : Add Oil

1-4 Tools and fixtures reguired for service

Ref. No.	Name		Part No.	Caved Jig No.	Remarks
J-1	Torque Measurement Cassette VHT-103S		J-6090-072-A		For FWD & back tension torque measurement
	Torque Measurement Cassette VHT-404S		J-6082-012-A		For CUE and REVIEW torque measurement
J-2	Alignment Tape	KRV-52NE (NTSC)	8-192-605-41		Tape path, Audio azimuth, X-value adjustments
		KRV-51N2 (NTSC)	8-192-605-32		Electrical adjustments, Operation check
		KRV-52PL (PAL)	8-192-605-46		Tape path, Audio azimuth, X-value adjustments
		KRV-51P (PAL)	8-192-605-36		Electrical adjustments, Operation check
J-3	Cleaning Fluid		Y-2031-001-0	—	
J-4	Chamois Leather		2-034-697-00	—	
J-5	Dental Mirror (with Handle)		J-6080-029-A	SL-5052	Tape path and tape traveling adjustments or checks
	Dental Mirror (Mirror)		J-6080-030-1		
J-6	Grease Molykote EM 30LG		J-6090-014-A		Net. 20 g
J-6	Diamond Oil NT-68		7-661-018-18		



<Fig 1-35>

2. Alignment and Adjustment

2-1 Tape Transport System and Adjustment Locations

The tape transport system has been adjusted precisely in the factory. Alignment is not necessary except for the following :
1) Noise observed on the screen.
2) Tape damage.
3) Parts replacement in the tape transport system.

Lower flange height of tape guide is used as the reference for the transport adjustment.
To maintain the height of the tape guide and prevent damage, do not apply excessive force onto the main base.

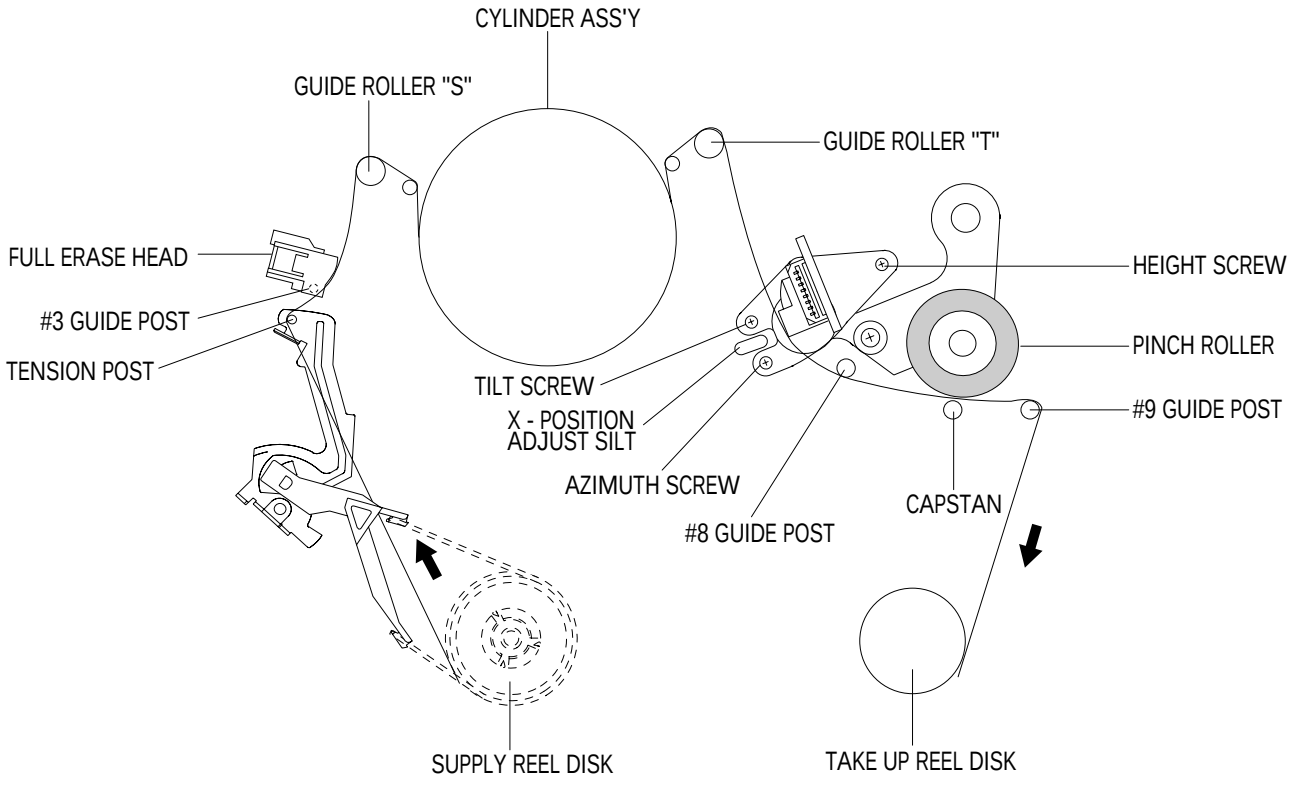


Fig. 2-1 Location of Tape Transport Adjustment

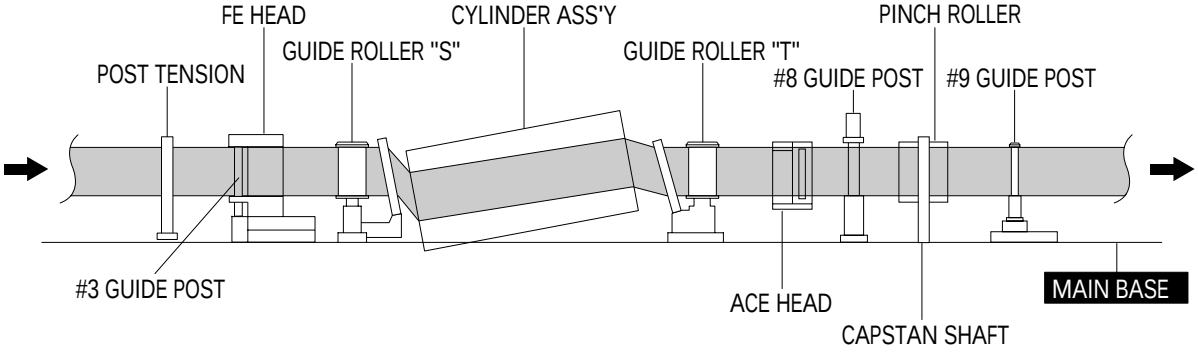


Fig. 2-2 Tape Travel Diagram

2-2 Tape Transport System Adjustment

When parts are replaced, perform the required adjustments by referring to procedures for the tape transport system. If there are any changes to the tape path, first run a T-120 tape and make sure excessive tape wrinkle does not occur at the tape guides.

1) If tape wrinkle is observed at the guide roller S, T, turn the guide roller S, T until wrinkle disappears.
2) If the tape wrinkle is still observed at the tape guide, perform the tilt adjustment of the ACE head. (See page 5-3 of the Service Manual for Test Point Locations.)

2-2-1 ACE Head Assembly Adjustment

2-2-1(a) ACE HEAD HEIGHT ADJUSTMENT

1) Run the alignment tape (KRV-52NE (NTSC) / 52PL (PAL)) in the playback mode.
2) Observe surface of the audio head using a dental mirror.
3) Turn screw (C) clockwise or counterclockwise until the gap of lower tape edge and the lower edge of the control head is about 0.25mm. (Refer to Fig. 2-3 and 2-4)

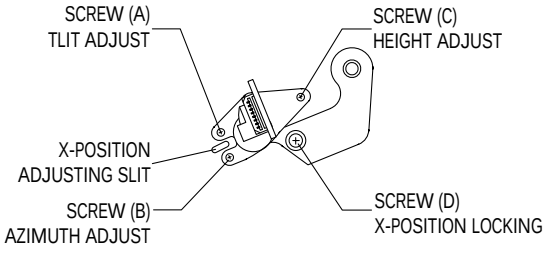


Fig. 2-3 Location of ACE Head Adjustment Screw

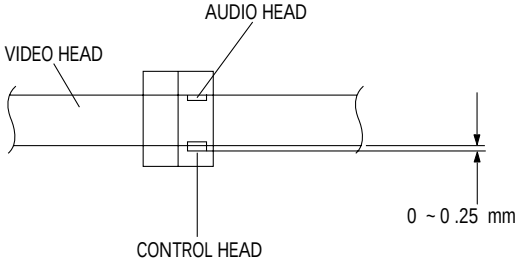


Fig. 2-4 ACE Head Height Adjustment

2-2-1(b) ACE HEAD TILT ADJUSTMENT

1) Playback a blank tape and observe the position of the tape at the lower flange of tape guide.
2) Confirm that there is no curl or wrinkle at the lower flange of tape guide as shown in Fig. 2-5 (B).
3) If a curl or wrinkle of the tape occurs, slightly turn the screw (A) tilt adjust on the ACE head ass'y.
4) Reconfirm the ACE head height.

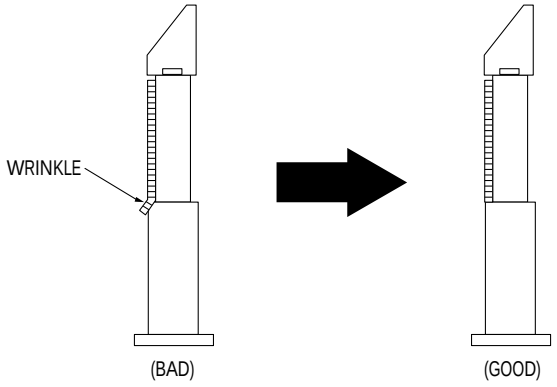


Fig. 2-5 Tape Guide Check

2-2-1(c) AUDIO AZIMUTH ADJUSTMENT

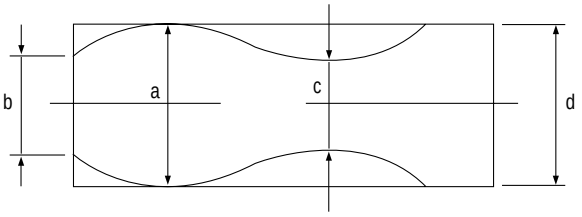
1) Load alignment tape (KRV-52NE (NTSC) / 52PL (PAL)) and playback the NTSC : 5KHz (PAL : 4KHz) signal.
2) Connect channel-1 scope probe to audio output test point.
3) Adjust screw (B) to achieve maximum audio level. (See Fig. 2-3)

2-2-1(d) ACE HEAD POSITION (X-POINT) ADJUSTMENT

1) See "2. Alignment and Adjustment" for ACE Head position (X-Point) adjustment.

2-2-2 Linearity Adjustment
(Guide roller S, T adjustment)

1) Playback the alignment tape (KRV-51N2 (NTSC)/51P (PAL)) (SP mode, Mono Scope).
2) Observe the video envelope signal on an oscilloscope (triggered by the video switching pulse).
3) Make sure the video envelope waveform (at its minimum) meets the specification shown in Fig. 2-6.
   If it does not, adjust as follows :



a b c d
c,b,d/a ≧63%

Fig. 2-6 Envelope Waveform Adjustment

Note :
a=Maximum output of the video RF envelope.
b=Minimum output of the video RF envelope at the entrance side.
c=Minimum output of the video RF envelope at the center point.
d=Maximum output of the video RF envelope at the exit side.

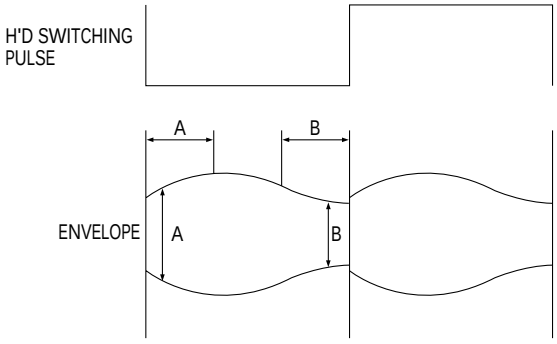


Fig. 2-7 Adjustment Points

4) If the section A in Fig. 2-7 does not meet the specification, adjust the guide roller S up or down.
5) If the section B in Fig. 2-7 does not meet the specification, adjust the guide roller T up or down.
6) Play back the alignment tape (SP mode, Mono Scope).
7) Connect an oscilloscope CH-1 to the Envelope and CH-2 to the H'D SW Pulse for triggering.
8) Turn the guide roller heads with a flat head ( ) driver to obtain a flat video RF envelope as shown in Fig. 2-8.

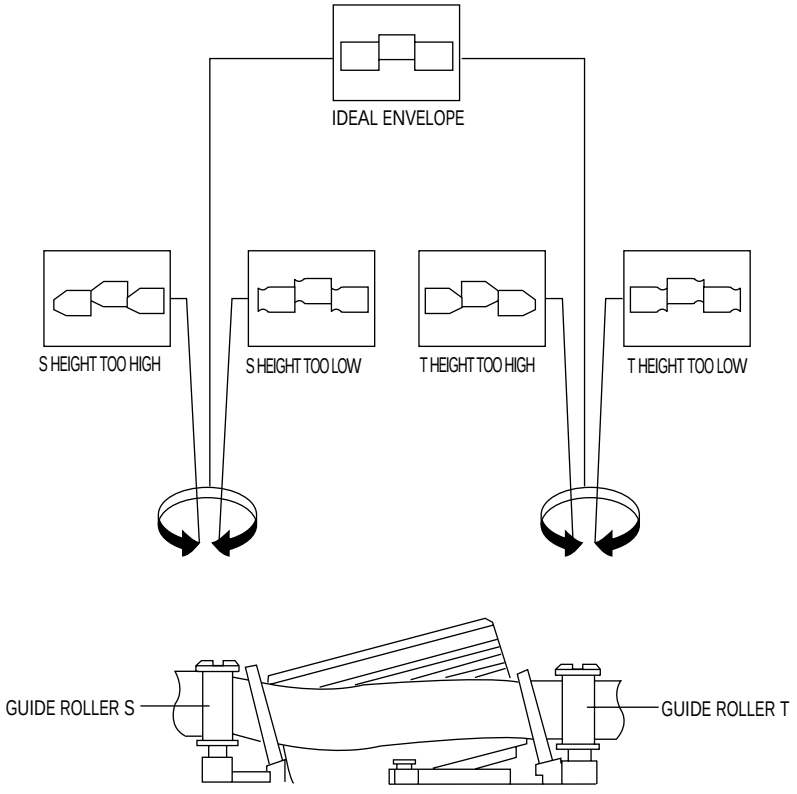


Fig. 2-8 Guide Roller S, T Height Adjustment

2-2-3 Check Transitional Operation from RPS to Play

Check transition from RPS mode to play mode :
Using a pre-recorded SP tape, make sure the entry side of envelope comes to an appropriate steady state within 3 seconds (as shown in Fig. 2-9).
If the envelope waveform does not reach specified peak-to peak amplitude within 3 seconds, adjust as follows :

1) Make sure there is no gap between the supply roller lower flange and the tape.
   If there is a gap, adjust the supply guide roller again.
2) Change operation mode from the RPS to the play mode (again) and make sure the entry side of envelope rises within 3 second.

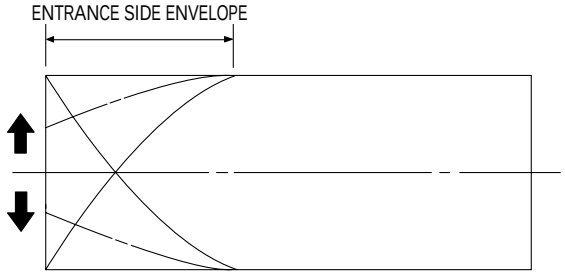


Fig. 2-9 Video Envelope Rising when Operation mode Changes from RPS to Play Mode

2-2-4 Envelope Check

1) Make recordings on T-120 (E-120) and T-160 (E-180) tape.
   Make sure the playback output envelope meets the specification as shown in Fig. 2-10.
2) Play back a self recorded tape (recording made on the unit using with T-120 (E-120).
   The video envelope should meet the specification as shown in Fig. 2-10.
   In SP mode, (A) should equal (B).
   If the head gap is wide, upper cylinder should be checked.

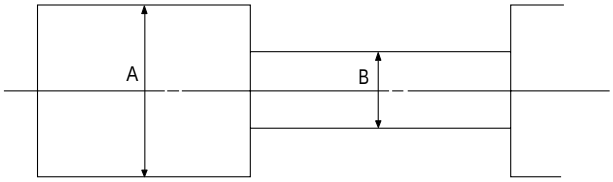


Fig. 2-10 Envelope Output and Output Level

2-2-5 Tape Wrinkle Check

1) Run the T-160 (E-180) tape in the playback, FPS, RPS and Pause modes and observe tape wrinkle at each guide.
2) If excessive tape wrinkle is observed, perform the following adjustments in Playback mode :

◆ Tape wrinkle at the guide roller S, T section :
Linearity adjustment.
◆ Tape wrinkle at tape guide flange :
ACE head assembly coarse adjustment.

2-3 Reel Torque

1) The rotation of the capstan motor causes the Holder Clutch Ass'y to rotate through the Belt Pulley.
2) The spring wrap PLAY/REV of holder clutch ass'y drives the disk reel S, T through gear idle by rotation of gear center ass'y.
3) Brake is operated by slider cam at FF/REW mode.
4) Transportation of accurate driving force is done by gears. (Gear Center Ass'y)

Note : If the spec. does not meet the followings specifications, replace the holder clutch ass'y and then recheck.

<Table 2-1>

MODE	TORQUE g/cm	GAUGE
PB	42 ± 11	Cassette Torquemeter
RPS	145 ± 30	Cassette Torquemeter

9-921-790-11

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Network Entertainment Group

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